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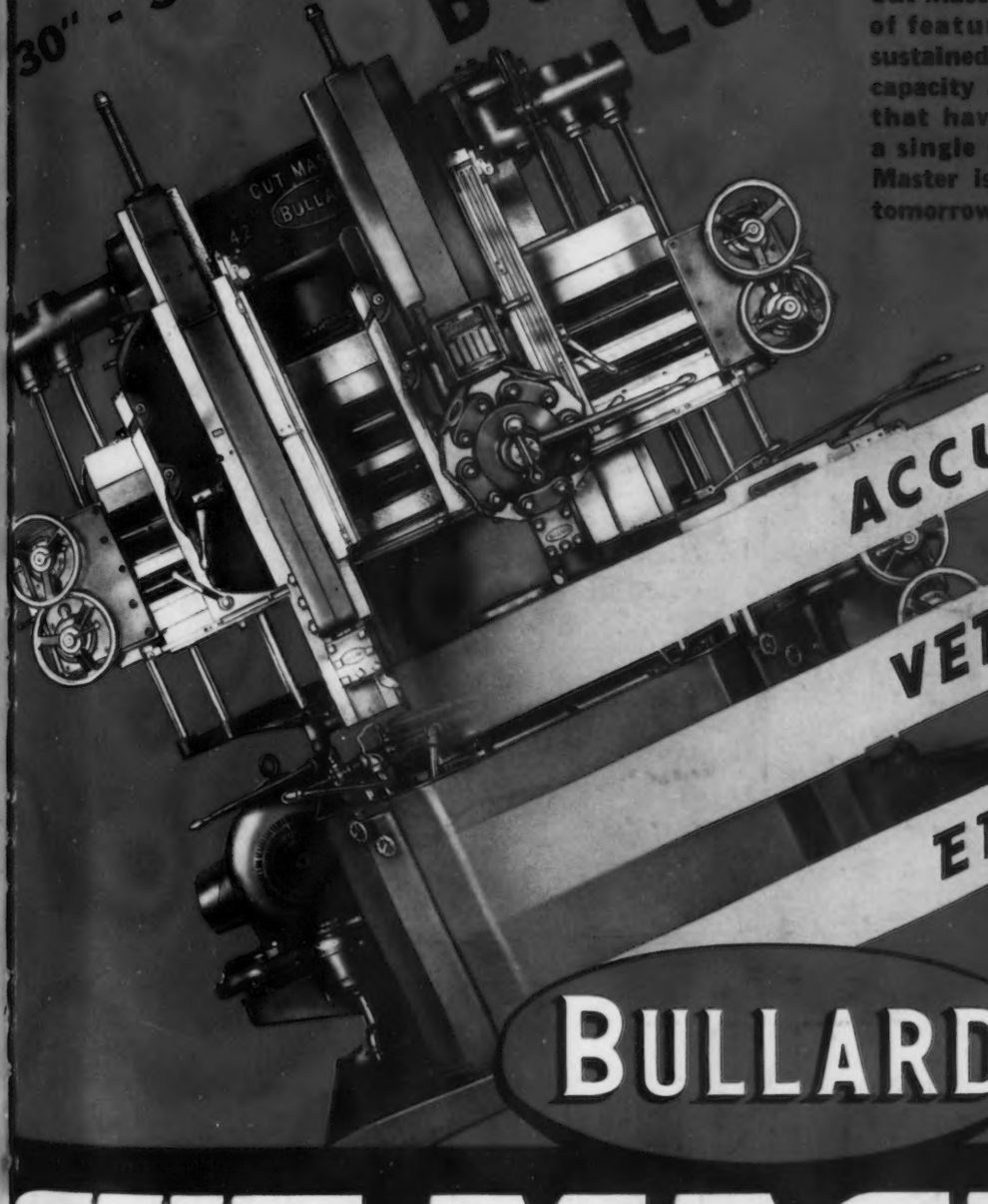

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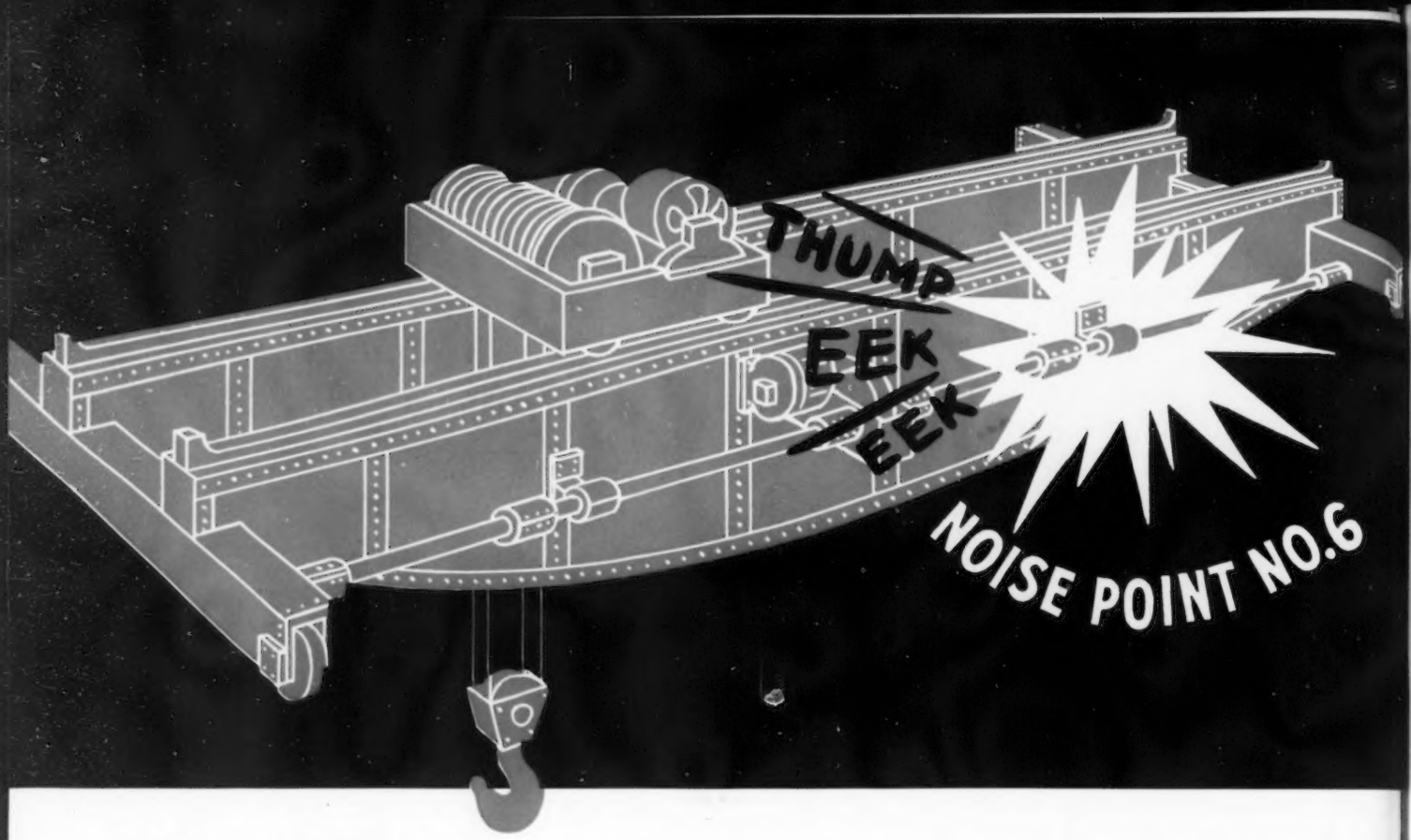

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THE IRON AGE

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OCTOBER 5, 1939

ESTABLISHED 1855 Vol. 144, No. 14

The "Peace Bloc"

BY and large, the American people want to keep out of war. To whom can they look for leadership?

Certainly not to an Administration that invites "excursions and alarums" by declaring national emergencies where none exist.

American industry, strangely enough, is leading the "peace bloc." It has put itself on record as hating war sufficiently to look askance upon the blood money it offers as bait in the way of profits.

Within the last week, Howard Coonley, of the National Association of Manufacturers, Charles Belnap, of the chemical industry, and E. T. Weir, spokesman for steel, have made plain and unmistakable the attitude of industry toward war.

The people and the industries that supposedly profit most from war are heading America's "peace bloc." That means something. It means that American industry has reached a point of development where it puts people and principles ahead of profits. And that should mean a great deal to the American people and to our American lawmakers.

And American industry, despite the so-called "profit motive" goes further than wanting us kept out of war. It wants Congress to keep us out of the business of exporting war munitions, if that will help to keep us out of it.

American industry does not want to make guns or bombs or engines of war for any one except Uncle Sam. And then only for self-defense.

American industry does not want "blood money" from Germany, France, England or any other nation. As Mr. Weir has said, "We will sell them plowshares, but if they beat them into swords, it will be their responsibility and not ours."

American industry is averse to being converted into a commercialized European arsenal. It will gladly sell to anyone its legitimate peace-time products, but dislikes dealing in the implements of destruction.

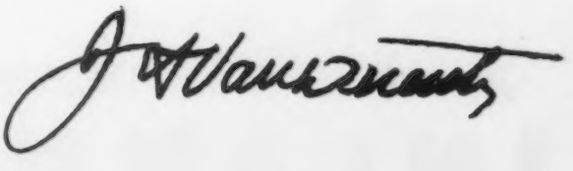
That, we believe, is the attitude of American industry. And we believe it will be the attitude of American legislators.

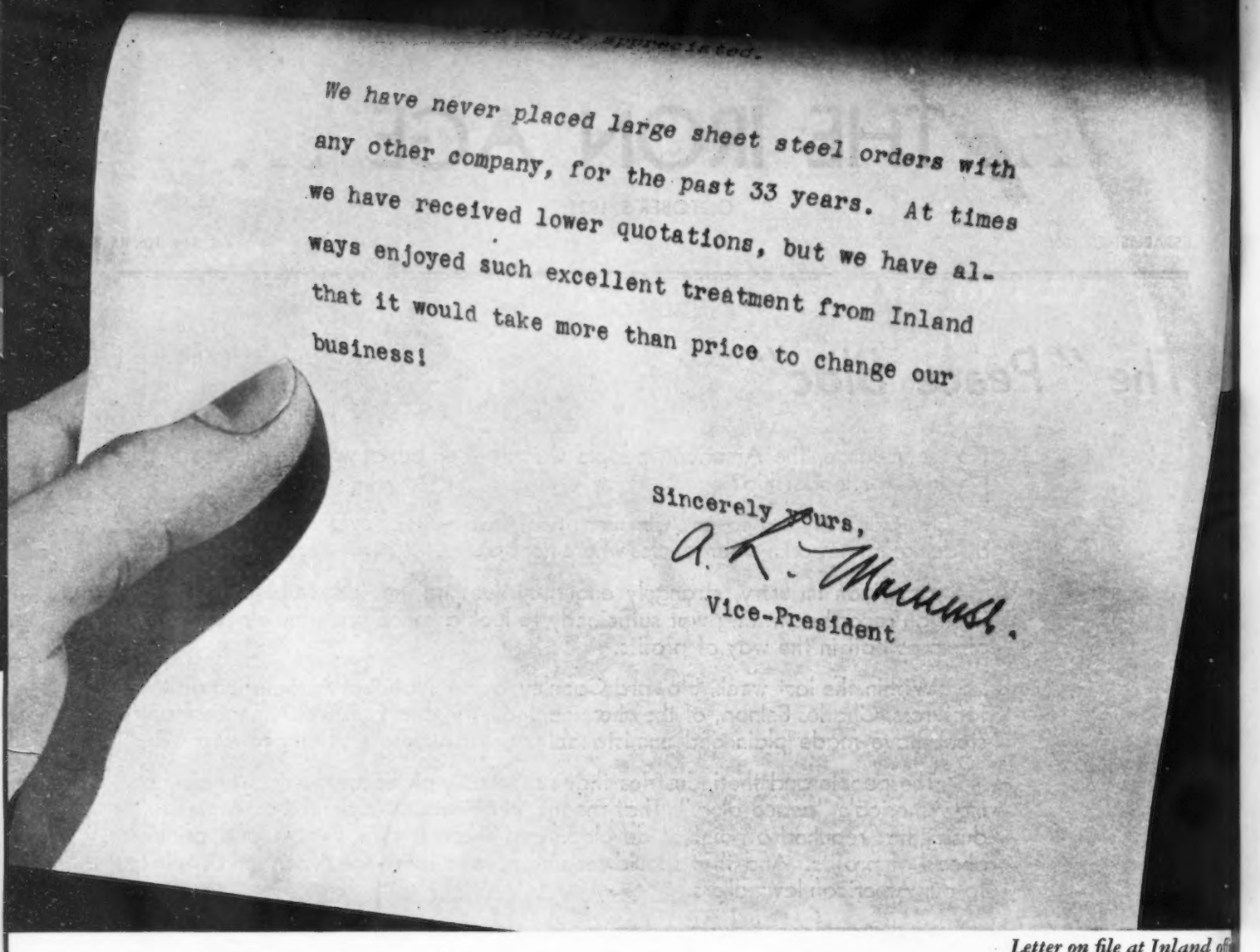
Americans want no blood money.

Industry does not want it.

American labor does not want it.

Who does?

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AGE-HARDENING

By JOHN T. NORTON
Associate Professor, Department of Metallurgy, Massachusetts Institute of Technology

AGE-HARDENABLE alloys are representative of the modern metallurgical trend in producing functional metals. What is age-hardening; what is the mechanism involved; what are the newer age-hardenable alloys and what are their properties? The author's broad background of experience puts him in position to answer these questions in detail and with authority.

EVERY designer of engineering structures, every user of metal parts, would like to have alloys which are custom built for his particular purposes. If the job is to be done in the most economical fashion, his requirements are usually of a special nature and he needs special alloys to meet these conditions. Under such circumstances, the commercial value of an alloy is enormously enhanced if its properties can be improved or adjusted at will by the process of heat treatment.

This situation is so well known in the case of steels that it usually is taken for granted, but imagine the situation if it were impossible to harden steel by heat treatment. A very considerable portion of the engineering world is founded on this process. On the other hand, it is quite generally believed that non-ferrous alloys will not respond to such treatment and that their properties are primarily dependent upon composition. At the present time this belief is far from true.

Practically all of the non-ferrous alloys of commercial importance can be modified so that they are susceptible to heat treatment and their properties may be adjusted over a considerable range by the process of age-hardening. It is true that the changes produced in this way may not be as great as in the case of some steels but they still are large enough (considerably) to increase the range of usefulness of an alloy. The tensile strength of duralumin is more than doubled by such treatment while that of a beryllium-copper alloy is increased nearly three times.

The age-hardening process generally is a treatment composed of two steps. *The solution treatment consists of a heating at fairly high temperature for a short time followed by rapid cooling or quenching.* This puts the alloy in its softest state. *The aging treatment is a reheating operation at a lower temperature for a somewhat longer time during which the hardness steadily increases.* The final hardness is dependent upon the time and temperature of aging, more rapid aging occuring at the higher temperatures. Some alloys such as duralumin will harden spontaneously at room temperature after the solution treatment, hence the term age-hardening. The process is also known as precipitation-hardening or dispersion-hardening because of the important part played by a precipitate in a fine state of dispersion throughout the alloy.

The development of the age-hardenable alloys is an outstanding example of the modern metallurgical trend of producing metals of desired characteristics by reasoning rather than by simple empirical methods. Of course, it is true that chance has played a considerable part in the discovery of many of the important alloys, but as more and more has been learned about the subject, the element of chance has become less and less. The important contribution made by metallurgists in the last decade has been to show that in spite of the apparently varied behavior of age-hardening alloys, they really represent minor variations of the same fundamental mechanism. When the rules of behavior have been discovered and formulated, then one is able to proceed with the development in a direct and logical way.

There is little hope of a startling discovery which will suddenly revolutionize the use of a particular alloy because of its age-hardening properties, but there is every reason to believe that many of the alloys now in use can be improved to increase their range of application. Age-hardening alloys have been referred to as "marginal" alloys in the sense that the improvement is just sufficient to make them meet requirements for which they were previously unsuitable. However, this small margin may mean the difference between an economical and an uneconomical application. But in many cases the improvement in properties due to age-hardening is so great that an alloy is applicable to a whole new class of service.

In spite of the considerable amount of research done during the last 20 years, the original theory of Merica, Waltenberg and Scott presented in 1919 adequately describes the major features of the age-hardening process. The same general mechanism accounts for the behavior of the majority of alloys in this class. Age-hardening, in its essentials, is a process of controlled precipitation carried out in such a way that a hardening constituent is dispersed through the alloy matrix in a proper size and distribution so that the maximum increase in hardness is obtained. The factors which exercise this control in a particular alloy are the time and temperature of the aging treatment.

In order to be age-hardenable, an alloy must be of the solid solution type with a limited solubility and a solubility which decreases with decreasing temperature. Among the binary alloys this type is quite common.

Consider the case of the silver-rich copper-silver alloys containing 8 per cent copper. At a temperature of 750 deg. C. (1382 deg. F.) all of the copper is in solid solution and the alloy is composed of a single phase. At room temperature, however, the solubility

has decreased to about 1 per cent of copper and the remainder will be in the form of particles of nearly pure copper distributed through the alloy. If this 8 per cent alloy is suddenly quenched from 750 deg. C., the excess copper does not have time to precipitate out and will be retained at room temperature in the form of a supersaturated solid solution. The alloy at room temperature is too rigid to permit the atoms to change places and the normal equilibrium to be restored. In this state the alloy is soft.

If the supersaturated alloy is now heated to about 150 deg. C. (302 deg. F.), sufficient mobility is imparted to the atoms so that the equilibrium slowly goes to completion with the rejection of the copper in a fine state of dispersion. Accompanying this precipation process is a steady increase in hardness. Generally the hardness curve plotted as a function of aging time goes through a maximum indicating an optium size and distribution of the precipitate. At low aging temperatures the maximum may occur at very long times while at higher aging temperatures it occurs in a few minutes. The softening of the alloy after the maximum is passed is called over-aging and is due to a growth or agglomeration of the precipitate particles beyond the critical size.

Different alloy systems show considerable differences in the way in which the precipitate forms. Some alloys, such as Cu-Ag, exhibit general precipitation in which the precipitate is found uniformly distributed throughout the metal grains. On the other hand, in other systems the precipitation takes place in definitely localized regions such as twin boundaries and grain boundaries. The aluminum-magnesium system is a typical example of this behavior. In some alloys, localized precipitation at the grain boundaries may have a very detrimental effect in reducing the ductility or plasticity and impact strength of the age-hardened alloy and it may also be responsible for very troublesome grain boundary corrosion.

It would be important to know just how the finely divided precipitate works to harden and strengthen the alloy and just what characteristics of the precipitate lead to the best mechanical properties. Unfortunately there is little positive evidence. The optimum size of the precipitate seems to be smaller than can be resolved under the microscope. Presumably the principal effect of the precipitate is an interference with the normal process of deformation in the alloy which is a gliding or slipping action along atomic planes. Perhaps the hardening effect is similar to the effect of sand on an icy sidewalk. But there is considerable reason to believe that the presence of a particle in the matrix introduces a distortion over quite a large volume as compared with its own size and it is this distortion which is largely responsible for the hardness.

This brings up the question of the nature of the precipitated phase or the hardening constituent. Should it be something which is inherently hard in order to promote the greatest hardness increase in the alloy or is its own hardness of no particular importance? Actually most of the precipitated phases are fairly hard but apparently this is not entirely necessary. For instance, in the copper-silver system, the precipitated phase from the silver-rich alloys is a copper-rich solid solution which is soft and ductile, yet the alloy hardens considerably. Possibly the high hardness of the precipitated phase in many successful alloys is merely an incidental consequence of the complex structure of the intermetallic compound.

METALS HARDENED BY DISPERSION

Metal	Hardening Element	Hardening Agent	Solubility: High — Wt. Per Cent	High — Temp., Deg. C.	Low — Wt. Per Cent	Low — Temp., Deg. C.
Aluminum	Be	Be	0.1	645	0.05	600
	Cu	$CuAl_2$	5.65	548 E	0.5	200
	Mg	β (SS)	14.9	451 E	4	200
	Si	Si +Al in (SS)	1.5	570	0.4	RT
	Ag	γ (SS)	48	558	0.75	200
	Zn	γ (SS Al in Zn)	13.4	250	2.7	RT
	Cu + 0.5 Mg	$CuAl_2$	5.0	535 E	0.2	200
	Mg_2Si	Mg_2Si	1.85	595 E	0.27	200
	Cu + 0.84 Mg + 0.58 Si	Mg_2Si + Al-Cu-Mg-Si	3.1 Cu	530	<0.4	400
	Cu + 0.84 Mg + 0.58 Si	Mg_2Si + $CuAl_2$ + Al-Cu-Mg-Si	4.7 Cu	515 E	<0.8	300
Cobalt	Be	CoBe				
Copper	Al	β inversion				
	Be	γ (SS)	2.4	800	0.75	400
	Cr	Cr(or CrCu SS)	0.8	1000	0.05–0.1	500
	Co	Co(or CoCu SS)	3.4	1000	0.35	RT
	Fe	Fe(+ Cu in SS)	3.5	1050	0.2	RT
	Pd	Cu_3Pd	100	555	16.7	400
	Pt	Cu_3Pt				
	Si	Cu_3Si	6.8	800	<2	RT
	Ag	Ag(+ Cu in SS)	2.3	779	0.09	RT
	Ti		4–4.5	878	0.4	RT
	Zn	β inversion	40–54	800	47–49	200
	Be + P					
	Zn + Ni_2Si					
	Be_2Si	Be_2Si				
	Co_2Si	Co_2Si + Co or Si	3.3	1000	0.3	300
	Cr_2Si	Cr_2Si				
	Mn_2Si	Mn_2Si				
	Ni + Al					
	Ni_2Si	Ni_2Si	8.2	1000	0.7	300
	Ni + Sn					
	Sn + Ni_2Si					
	Ni + P	Ni_2P				
	Sn + P + Ni_2Si					
Gold	Cu	AuCu	100	520	12	RT
		Suppressed Change				
	Fe	$AuFe_2$	36	1180	10	400
	Pt	β(PtAu + Au)	100	1150	20	600
	Ni_2Si	Ni_2Si				
	Co_2Si	Co_2Si				
	Cr_2Si	Cr_2Si				
	Ni	Ni + (Au SS)	40	830	8	600–300
	Ni + Al					
	Ni + Zn					
	Ag + Cu					
	Pd + Zn					
	Pt + Zn					

Metal	Hardening Element	Hardening Agent	Solubility High		Solubility Low	
			Wt. Per Cent	Temp., Deg. C.	Wt. Per Cent	Temp., Deg. C.
Iron	Be					
	C	Fe_3C	0.04	710 E	0.006	RT
	Cu	Cu(+ Fe SS)	3.4	810 E	0.4	600–RT
	Mo	Mo or Fe_3Mo_2	24	1440	6	400
	N	Fe_4N	0.5	580 E	0.01	RT
	O	FeO	0.10	715	0.035–0.05	RT
	W	Fe_2W_2	33	1525 E	8	RT
	Cr + Ni + B					
	Ni + Ti					
	Ni + Mn + Mo					
	Ni + Ti + Cr					
	Ni + Mn + Co + Ti					
	Ti + Mn + Ni	Fe_2Ti	6.3	1300		
Lead	Sb	Sb	2.45	247 E	0.80	RT
	Sb + Cd					
	Sb + Cu	Compd				
	Sb + Ag	With Sb				
	Sb + Mn	With Sb				
	Sb + As	With Sb				
	Cd + Sn					
	Ca	Pb_3Ca	0.1	328 P	0.01	RT
Magnesium	Al	Mg_3Al_2	12	435	<6	RT
	Cd(Slight)					
	Zn	$MgZn_2$	6	342 E	2	RT
	Sn(Slight)		3–4	E		
Molybdenum	Fe	Fe_3Mo_2	11	1540	5	RT
Nickel	Be	NiBe(compd)	2	1140		
	Mg				<0.1	500
	Mg + C				<0.1	500
Monel	Al					
	Ti					
	Si		4.1	900	3.1	600
Palladium	Cu	PdCu	Supressed change 37 to 50 per cent Cu, 670° to 620° C.			
	Cu + Ag	PdCu?				
	Cu + Au + Ag	AuCu + PdCu?				
Platinum	Cu	PtCu	Suppressed Change			
	Au	β (SS)	100	1150	5	600
	Ag + Au + Cu					
	Fe?					
Silver	Cu	Cu(+ Ag in SS)	8.9	799	0.94	RT
	Cu + Al	$CuAl_2$				
	Cd	γ(SS)				
	Cu + Cd	Cu_2Cd				
	Pd + Cu					
	Si					
	Si + Cu	Cu_3Si				
	Zn	β inversion				
	(92Ag.5 7.5 Zn) + Cu		7	700	<1	280
	Cu + Mg	Cu_2Mg?				
	Cu + Sb	Cu_2Sb?				
	Mg + Zn	$MgZn_2$				
	Cd + Sb	CdSb?				
Tin	7% Sb + 2% Cu					
Zinc	Al	Al + (Zn in SS)	β Inversion			
	Cd	Cd + (Zn in SS)	3.7	263 E	0.92	142
	Cu + Ag					

E signifies eutectic or eutectoid temperature; RT, room temperature; SS, solid solution; P, Peritectic temperature.

Presumably the ideal situation would be one in which the precipitation started from a very great number of nuclei distributed uniformly through the matrix and these nuclei should grow so that all would reach the critical size at the same time. At this time, all of the precipitating element would be used up so that the particles could grow no farther. If in addition some mechanism could be added to prevent the coalescence of these particles, so that the alloy could not over-age, then there would be obtained a truly perfect alloy. Under such circumstances, the nature of the hardening constituent itself would be of little significance.

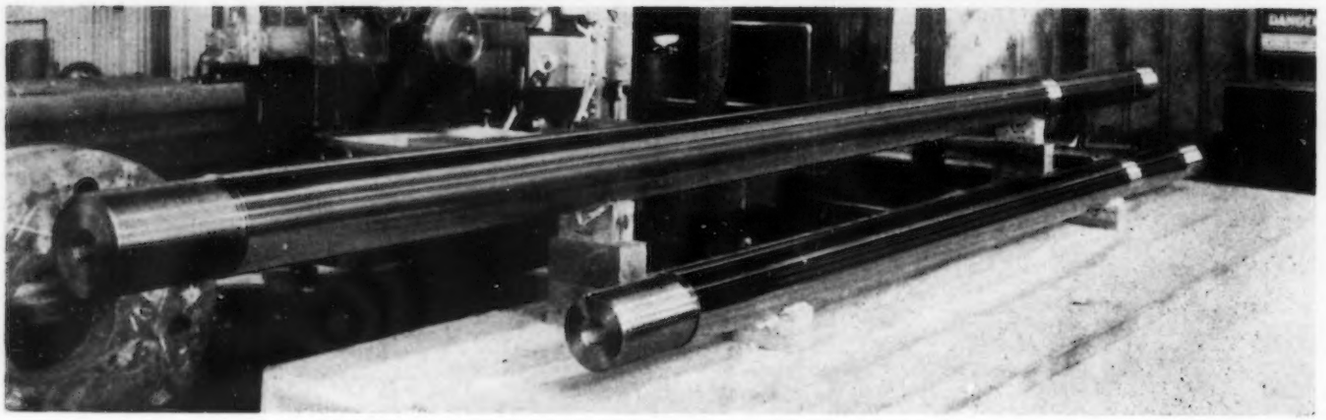
In several systems it has been observed that a transition phase precipitates and later transforms into the normal phase which would be predicted by the equilibrium diagram of the system. Such a phase is well known in the case of duralumin containing about 4 per cent of copper. Possibly these transition phases which are difficult to discover and examine may be much more common than is generally believed and they may be the essential hardening constituents. Complex in structure, they would be inherently quite hard. This idea, however, is largely speculation.

The current discussions on the mechanism of age-hardening seem to be centered about the conditions at the beginning of precipitation. The aging of the copper-bearing duralumin at room temperature appears to have been the starting point of the controversy. Under these conditions, there is no direct evidence of precipitation and the electrical resistivity appears to change in an anomalous fashion. Investigators both here and abroad have been divided more or less into two camps, those beliving that the simple precipitation theory could be modified to cover all of the observed facts and those who feel that there is some sort of pre-precipitation phenomenon at work which plays an important role in the process.

The most recent contribution comes from three French investigators, Calvet, Jacquet and Guinier, writing in the *Journal of the Institute of Metals*, who have shown, by a very beautiful X-ray technique, that at an early stage of room temperature aging of a pure copper-aluminum alloy, the copper atoms are segregated in tiny plates whose dimensions are perhaps a hundred atoms on a side and about two atoms thick. The question now resolves itself into whether such a segregation is to be called a precipitate or a pre-precipitate.

The metallurgist can tell from an examination of the phase diagram whether a binary alloy is inherently capable of age-hardening. The phase boundary must be such that a decreasing temperature will cause a decrease in solubility. The beryllium-copper is of this type. On the other hand the zinc-copper system shows an increasing solubility of zinc in copper as the temperature is lowered and consequently no age hardening is possible. Of course it is true that some systems which have the correct type of phase diagram may exhibit such a small change in hardness as to be of no practical importance.

But, the real metallurgical triumph is the fact that in many cases the addition of a third element may convert a non-aging system into one which will age. Monel metal containing about 70 per cent nickel and 30 per cent copper is a simple solid solution at all temperatures and consequently will not respond to heat treatment. However, by the addition of about 0.5 per cent of aluminum it becomes an important age-hardening alloy and at the same time retains the many valuable properties



KMONEL valve stems for the Tygart River dam. The larger one is 7 in. in diameter and 18 ft. 5¼ in. long; the two average 153,500 lb. per sq. in. in tensile strength, and have the alloy's characteristic resistance to corrosion.

of the original composition. In the same way, the low tin bronzes are not susceptible to heat treatment but the addition of a small amount of nickel so changes the solubility relations that they become age-hardenable and they find new applications. Unfortunately the phase diagrams of ternary systems have not been worked out so completely as in the case of binary systems, so that an empirical method of investigation is still necessary to find the proper addition elements, but rapid progress is being made in this direction. To indicate the wide range of possibilities, the accompanying table taken from the Institute of Metals annual lecture of A. I. M. E. given by Paul D. Merica is included. Since its preparation some seven years ago, numerous other systems have been studied. Obviously it is not possible to discuss each of these in detail but perhaps it will be of interest to examine a few typical cases which have some degree of commercial importance. The values of the mechanical properties have been obtained from the manufacturers' bulletins and the National Metals Handbook.

Strong Wrought Alloys

At the head of this list must be placed the copper alloy containing from 2 to 2.5 per cent of beryllium.* While retaining the corrosion resistance and good electrical properties of the copper-rich alloys, it is capable of a tremendous increase in hardness and strength which makes it comparable with a medium-carbon steel. The heat treatment of this alloy consists of a quench from 800 deg. C. (1472 deg. F.) followed by aging at 275 deg. C. (527 deg. F.) for about 4 hr. This aging treatment for a typical alloy increases the Brinell hardness from 100 to about 350, the proportional limit from 8000 lb. per sq. in. to 46,000 lb. per sq. in., and the tensile strength from 70 000 lb. per sq. in. to about 175,000 lb. per sq. in. On the other hand, the elongation in 2 in. drops from 45 to 6.3 per cent.

In this alloy the hardening effects of cold working and aging are additive to some extent and if the quenched alloy is hard rolled and then aged, the hardness is further increased to a Brinell hardness number of 365, the proportional limit to 55,000 lb. per sq. in., the tensile strength to 193,000 lb. per sq. in., while the elongation drops still farther to about 2 per cent. The alloy finds application in springs, particularly in the electrical industry, diaphragms, wearing parts, non-sparking tools and other fields where a non-magnetic alloy of high strength and hardness, good electrical conductivity and excellent corrosion resistance is required. Its fatigue resistance in the aged condition is probably higher than for any other copper-base alloy, and a conservative value for the endurance limit is 35,000 lb. per sq. in.

The very considerable loss of ductility which accompanies the increase in strength is characteristic of most, though not all of the age-hardening allovs. At first this might seem a very real disadvantage but it will be remembered that all of the forming during fabrication can be done in the quenched state when the ductility is entirely adequate.

The behavior of the electrical conductivity is interesting and again is typical of most age-hardening alloys. As the aging takes place, the beryllium in solution in the copper almost entirely precipitates out leaving a matrix of copper which contains less than 1 per cent impurity in solution. This copper matrix is thus a good conductor and the overall conductivity of the alloy after hardening is about 25 per cent of pure copper. It is to be noted that some commercial Be-Cu alloys contain about 0.5 per cent nickel which prevents excessive grain growth during the solution heat treatment.

Closely related to the Be-Cu alloys is the beryllium-nickel alloy containing about 2.5 per cent beryllium.* Although not capable of quite such high strength, it does have a higher aging temperature of 500 deg. C. (932 deg. F.) which permits it to be used at higher temperatures without softening due to over-aging. This alloy has found some limited application for springs to operate at elevated temperatures. Naturally, alloys containing such small amounts of beryllium would not be expected to benefit from the low specific gravity of this element.

Another important representative of this group is the aluminum-copper-nickel alloy which is sold under the trade name of "K" monel. Its nominal composition is 66 per cent nickel, 29 per cent copper and 3 per cent aluminum. The solution treatment is a heating operation at 788 deg. C. (1450 deg. F.) followed by a water quench and the aging takes place at about 650 deg. C. (1200 deg. F.). The annealed material in bar form will have the following typical mechanical properties: Brinel hardness 180, yield strength 70,000 lb. per sq. in., tensile strength 110,000 lb. per sq. in. with an elongation of 35 per cent. After heat treatment these values are increased to: Brinell hardness 260, yield strength 110 000 lb. per sq. in. tensile strength 150,000 lb. per sq. in., and an elongation of 20 per cent. If the bar is cold drawn before aging and then aged, the

* See article, "Beryllium Alloys," in Sept. 7 issue.—Ed.

effect of the cold work is retained in spite of the high aging temperature and the properties are found to be: Brinell hardness 320, yield strength 130,000 lb. per sq. in., tensile strength 170,000 lb. per sq. in., and elongation of 15 per cent. Truly an unusual range of properties for a non-ferrous alloy and a considerable advance over the normal monel metal from which it was derived.

This alloy finds use where its splendid corrosion resistant properties combined with high strength are necessary. It has the ability to retain its strength at high temperatures, a property which enormously increases its range of uses.

Probably the most widely used structural alloy capable of age-hardening is duralumin. Certainly the alloys of this type have received a more careful study than any other age-hardening system. Possessing a good combination of weight and strength, ease of fabrication and a simple heat treatment, this alloy has come to play a vital part in the world of engineering. A typical duralumin is the 17S alloy of the Aluminum Co. of America. Its nominal composition includes 4 per cent copper and 0.5 per cent each of magnesium and manganese, the remainder being aluminum. The solution temperature is 510 deg. C. (950 deg. F.) and the aging takes place at room temperature, maximum values being reached in about four days. Upon age-hardening, the Brinell hardness increases from 45 to 100, the yield strength for a 2 per cent deviation from the modulus line from 10,000 lb. per sq. in. to 37,000 lb. per sq. in., and the tensile strength from 26,000 lb. per sq. in. to 60,000 lb. per sq. in. An important feature of this alloy is that the elongation remains constant at about 20 per cent. Some increase in strength and hardness can be obtained by cold rolling after age-hardening but with considerable loss in ductility. The specific gravity of this alloy is 2.79. These values are typical.

A somewhat stronger alloy, designated as 24S, is obtained by increasing the copper and magnesium contents but the alloy is slightly inferior in workability. These alloys are manufactured in a wide variety of shapes, sheets, tubing and wire. The possibility of heat treating these structural alloys has enormously widened the scope of their application.

A typical corresponding representative of the magnesium base group of wrought structural alloys would be Dowmetal X. This has a nominal composition of 3.0 per cent aluminum, 3.0 per cent zinc and 0.2 per cent manganese, the remainder being magnesium. In the form of extruded bars in the fully aged condition, this alloy has a Brinell hardness of 62,

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THIS clamshell dredge carries a 240-ft. boom with a 150-ft. aluminum alloy peak section. The dredge is owned by the Sternberg Dredge Co., St. Louis.

a yield strength of 28,000 lb. per sq. in., tensile strength of 43,000 lb. per sq. in., with an elongation of 14 per cent. It has a specific gravity of 1.8. Considerable development is taking place in the magnesium alloy field and recent work has indicated that silver is a valuable addition as an age-hardening element. Some of these alloys have tensile strengths in the neighborhood of 60,000 lb. per sq. in.

CUTTING steel with a beryllium-copper cold chisel and hammer. The hardening effects of cold-working and aging are additive to some extent in this type of alloy.

The chief value of the magnesium-base alloys is their lightness, and for this reason they are finding greater and greater uses in fields where weight is at a premium. Light-weight non-stressed structures such as airplane engine covers and housings have been made of magnesium alloys for some time but with the advent of the higher strength alloys, the uses have been multiplied. Such parts as airplane propeller blades are in considerable use abroad and many similar developments are to be expected.

A most interesting group of alloys designed for use at high temperatures and in which age-hardening plays an important part are the nickel-cobalt-iron-chromium alloys developed by the Westinghouse Electric & Mfg. Co. and known under the general name of "Konel". In these alloys the age-hardening agent is titanium, although the actual precipitated phase has not been identified. A typical alloy of this group contains 47 per cent nickel, 29 cobalt, 6.5 iron, 2.4 titanium and 14 per cent chromium. After age-hardening at 650 deg. C. (1202 deg. F.), it was tested at 600 deg. C. (1112 deg. F.) and gave a proportional limit of 66,000 lb. per sq. in., a tensile strength of 120,000 lb. per sq. in., with an elongation of 11 per cent. A most remarkable alloy by any standard.

Cast Age-Hardening Alloys

Many alloys which show excellent response to heat treatment in the wrought condition, do not respond well in the cast state. It is generally believed that this is due to a segregation of the aging elements during solidification and a strong working of the alloy is necessary to make the solution heat treatment effective. Nevertheless, several useful casting alloys have been developed which are susceptible to age-hardening. The usual beryllium-copper composition can be age-hardened in the cast state, using the normal heat treating cycle, and properties are obtained which are only slightly inferior to the wrought alloys.

In the light alloy field there are several casting alloys which are age hardenable based both on aluminum and magnesium. A typical aluminum-base alloy is one having a nominal composition of 10 per cent magnesium and 90 per cent aluminum. In the heat treated condition it develops a tensile strength of about 45,000 lb. per sq. in., with an elongation of 12 to 14 per cent. It has a low specific gravity of 2.55, a good impact strength and an excellent corrosion resistance. It has found wide application in the railway industry and in the construction of excavating machinery where the strength and impact resistance combined with lightness are desirable.

Another important casting alloy is the hardenable nickel-bronze, a typical composition for which is 88 per cent copper, 5 per cent nickel, 5 per cent tin and 2 per cent zinc. When age-hardened under the best conditions, this alloy exhibits a tensile strength of 70,000 to 90,000 lb. per sq. in., a yield point at 0.5 per cent set of 50,000 to 74,000 lb. per sq. in., and an elongation of 25 per cent. A conventional heat treating cycle, consisting of a quench from the solution temperature followed by an aging treatment, develops the maximum strength but a considerable response is obtained simply by aging the as-cast alloy. The principal field of use of such an alloy is where greater strength is desired than is possible with a straight bronze coupled with the need of controlling the properties by means of heat treatment.

The development of a large group of alloys which are susceptible to improvement by thermal treatment has provided the designer and manufacturer of metal products with new materials with which to work. This in itself is a noteworthy achievement. But the metallurgical work which has led to this development has accomplished something of even greater importance. It has shown that alloys which are capable of heat treatment are much more common than has been generally supposed and in fact constitute the rule rather than the exception among alloy systems. This work has taught the metallurgist much about the rules governing the behavior of these systems and augurs well for the future, suggesting that the results achieved thus far are merely a preliminary step in a much greater development. The situation is an excellent illustration of the splendid results which can be accomplished when the inventive imagination and the fundamental knowledge of the metallurgist are tempered by the practical experience and the economic viewpoint of the engineer. It is an outstanding example of the benefit to be derived from a whole-hearted cooperation of science and industry.

STEEL STANDARDIZATION

By A. L. HARTLEY
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IN the Sept. 7, 14 and 21 issues, the author presented tabulated data and discussions dealing with the characteristics of the various types of steel required by machine tool builders, and gave a summarization of a recommended group of steels suitable for all requirements in most plants. In this, the fourth section of a five-part article, there is given an outline of the properties which should be definitely specified, and typical purchasing specifications are set forth and discussed.

FLAT STOCK: Although the use of flat stock is comparatively limited, the adoption of a standard stock list is essential to prevent designers from specifying unavailable items. A carefully prepared list will also avoid an unnecessarily large number of inactive stock sizes. Cold-drawn flat bars are usually not available in a complete range of sizes, except in the SAE 1020 and X-1020 grades. However, square bars can be obtained in SAE 1020, SAE X 1020, SAE 1040 and SAE 1045. There are also a few sources that stock a very limited number of alloy flats and squares.

In order to avoid unavailable items being shown on drawings, a chart should be made showing all of the stock sizes of cold-drawn flats. This chart (as shown in Fig. 3) should clearly show the sizes available in local warehouses, sizes available in non-local warehouses, and items that are used in sufficiently large quantities to permit them being listed as stock items. A simple key, as shown in the illustration, is self explanatory and will avoid a great deal of confusion.

Most plants have a few applications, such as electrical control box mountings, etc., that require the use of small hot-rolled flats. A careful study of these applications will usually show that four to six well selected sizes will meet all requirements. These items should be listed on a chart similar to the one shown in Fig. 3. It is also desirable to show the available sizes of wide-width sections of hot-rolled stocks. It is frequently not necessary to list any of these sections as standard. It should be clearly understood that this set-up applies primarily to manufacturers of mechanical equipment. No doubt there are many organizations that require much greater amounts of hot-rolled flats. In such cases a standard stock list of those items would be essential.

It will be noted on Fig. 3 that several sizes of square stock are listed as key stock. These sizes should be stocked in precision squares which are made plus 0.001 in. to plus 0.0015 in. above the nominal fractional size. The number of sizes of this type of stock carried depends entirely on the requirements of a given plant.

It is usually desirable to list a limited number of sizes of alloy flats. Unless the consumption of these items is sufficiently large to permit each size

being purchased in lots of at least 2000 lb. to 4000 lb., it is necessary to use hot-rolled or forged bars. Commercial alloy cold-drawn flats are not generally available. It might also be pointed out that cold-drawn alloy flats are not entirely free from kinks and twist. Such stock is not suitable for precision parts, such as machine tool racks, without very special straightening operations. In view of the conditions just outlined, it is usually desirable to make a very careful analysis of actual requirements and limit the stock of flats to a minimum number of hot-rolled or forged sections.

The use of high-carbon tool steel flats is usually comparatively limited. For this reason it is seldom necessary to stock more than five or six items. However, it is desirable to furnish the designers with a stock list similar to the one shown in Fig. 3.

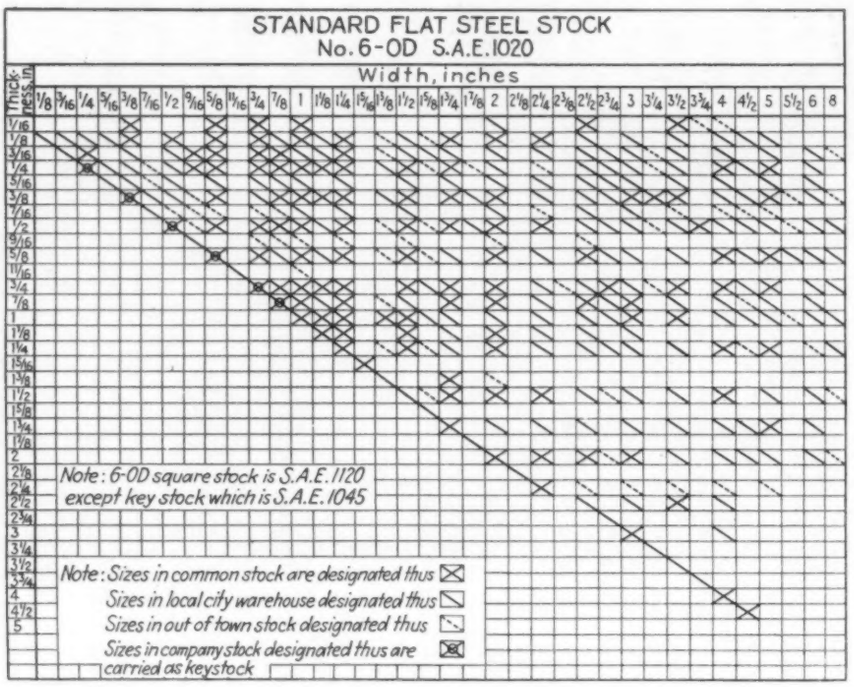

STANDARD FLAT STEEL STOCK
No. 6-OD S.A.E. 1020
Width, inches
Thickness
Note: 6-OD square stock is S.A.E. 1120 except key stock which is S.A.E. 1045
Note: Sizes in common stock are designated thus
Sizes in local city warehouse designated thus
Sizes in out of town stock designated thus
Sizes in company stock designated thus are carried as keystock

FIG. 3—This type of chart shows all the stock sizes of cold-drawn flats, i.e., sizes available in local warehouses, sizes available in non-local warehouses, and sizes stocked at the plant.

Hexagon Stock

The hexagon stock list depends entirely on the plant involved. If hexagon cap screws and nuts are purchased there is very little need for hexagon stock. However, if cap screws and nuts are made in the plant it will be necessary to stock the required grades and sizes. It is generally advisable to make the stock chart in such a manner that the designer can have a complete list of plant stock sizes and available warehouse sizes.

Standard Steel

The standard steels for special application are used in much smaller quantities than the regular line. Most of these steels are generally available only with the hot-rolled finish in the quantities required. As stated earlier in the discussion, they are used for parts that cannot be run from one of the standard grades. For this reason, it is generally not advisable to list standard items because the change in design of a single machine might result in an appreciable amount of expensive steel becoming inactive. The writer is of the opinion that a complete list of available sizes of both flats and rounds should be furnished the designers and the steel should be purchased as required. However, the standards engineer should watch the application of these grades and keep a careful record of the various sizes that are most active. In this manner it is frequently possible to make certain sizes sufficiently active to appreciably reduce the net cost.

Purchasing Specifications

To obtain uniform steel it is necessary to set up definite purchasing specifications. Although there are numerous items involved, if the following ten are properly specified good uniformity can generally be obtained:

(1) Analysis.

(2) Grain size, McQuaid-Ehn or A.S.T.M. E19-33.

(a) If specified as fine or coarse grain an extra is not involved. But, if definite grain size is specified an extra is charged.

(b) This test is not applied for tool steel specifications.

(c) Carbon tool steel should be checked by means of some form of penetration of hardness test. (A suggested test will be described next week in the fifth section of this article.)

(3) Grain structure.

(4) Heat treatment.

(5) Hardness as-received.

(6) Hardenability.

(a) This specification should not be applied for grades of steel which must be heat treated to a hardness range near the upper hardness limit for the materials involved.

(7) Surface decarburization (cold-drawn stock).

(8) Surface finish.

(9) Size tolerance.

(10) Straightness.

If parts which are not heat treated are subject to very severe strains, it may be advisable to definitely specify physical properties.

If the specifications are not set up very carefully they may unduly increase the cost. In view of this fact, it is usually desirable to work in conjunction with metallurgists representing the various suppliers. There are some grades that do not require close control on all of the points outlined. In such cases the specifications can be set up accordingly.

The following purchasing specification "No. 3" is a typical example for an alloy oil-hardening grade:

Specification No. 3

Grade: SAE 4145 standard analysis acceptable; however, a carbon content of 0.43 to 0.48 is desired.

Grain size: This steel is to have a 6 to 8 grain size as checked by the McQuaid-Ehn test (A.S.T.M. E-19-33).

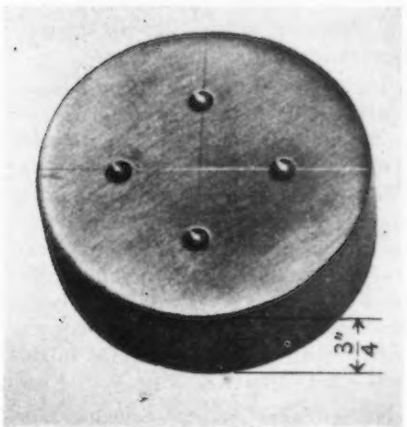
Grain Structure: This steel to be furnished with a lamellar-pearlitic structure.

Heat Treatment: This steel is to be

heat treated at a temperature above the upper critical and cooled at the proper rate to produce the required grain structure and hardness.

Hardness: This steel to be furnished within the Brinell hardness range of 187 to 217 with a desired hardness of 207. (A check to be made on the surface and at one-half radius, as shown in Fig. 4.)

Hardenability: A specimen, similar to that shown in Fig. 5, should harden to at least 49 R_c when placed in a furnace at 1500 deg. F. held for 45 min. and oil-quenched in a good commercial quenching oil. Samples from bars smaller than 3½ in. in diameter are to be cut as shown in Fig. 4. Rockwell readings to be taken as shown on suface "B" Fig. 5.



AT LEFT

FIG. 4—Specimen used for hardness of alloy oil-hardening steel. Brinell readings are taken at one-half radius.

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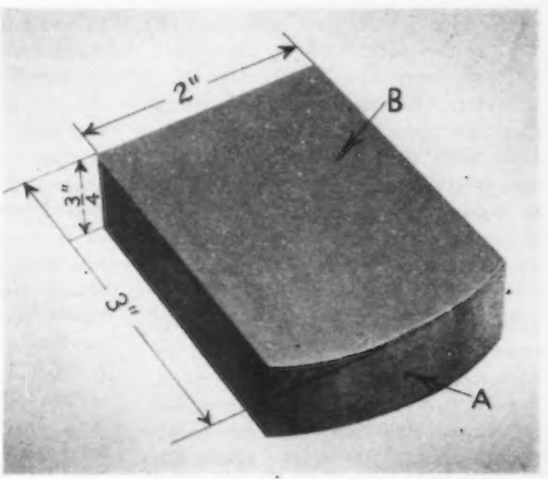

AT RIGHT

FIG. 5 — Specimen used for determining hardenability of alloy oil-hardening steel. Rockwell readings are taken as shown on surface B.

Finish: The required finish is indicated on the order.

Straightness: All cold-drawn or turned and polished stock must be reasonably straight and free from kinks. All hot-rolled stock must be machine straightened.

Surface decarburization — cold-drawn stock: The drawn surface of the hardenability specimen must show a hardness of at least 40 R_c after 0.010 in. has been removed from the surface.

Size: Size variations must be within the limits of commercial tolerance.

In the specification just described, the SAE 4145 analysis is listed as acceptable, but it is stated that a carbon range of 0.43 to 0.48 per cent is desired. If a limited carbon range is definitely specified a check analysis is required, and this carries an extra.

On the other hand, mills usually can select a heat of steel that will fall within the desired range or very close to it, if the orders are placed so that rush deliveries are not essential. In this way the extra can be avoided and the desired analysis will usually be obtained.

A fine-grain steel is specified in the set-up just described because most alloy steel parts used in machine tools or related work have comparatively small sections that require the greater toughness that is characteristic of this type.

The lamellar-pearlitic structure as specified for this grade has been proved to have appreciably better machining characteristics than other structures in the same hardness range. However, for a hypereutectoid steel the spherodized structure is more desirable.

An alloy steel of the above type (SAE 4145) usually has the best machining characteristics at a hardness of 207 Brinell. In view of the fact that it is impractical for any mill to produce steel to a definite hardness, the limits of 187 to 217 Brinell were set up. The steel that is on the low side of this range will not machine quite as well for such operations as broaching and gear shaping, but will have excellent machineability for turning and forming. Whereas, the steel on the hard side of the range will be more suitable for broaching and gear shaping but not quite as good for the turning and forming operations. However, steels within the above hardness limits, treated to the proper structure, can be relied upon to have a satisfactory machineability.

An alloy oil-hardening steel must have uniform hardenability. For this reason it is essential that some standard method of checking this feature must be provided. Although there are many tests that can be applied, the one specified is comparatively inexpensive to make and has proved entirely satisfactory.

There is very little advantage in cutting the type of specimen shown in Fig. 5 for bars smaller than 3½ in. in diameter. The type of block shown in Fig. 4 is cheaper to obtain and gives satisfactory results for the smaller bars.

The specifications pertaining to finish, straightness and size are entirely self-explanatory.

In addition to the specifications mentioned, it is also necessary to set up specifications for forgings. Most plants have requirements that necessitate the use of alloy steel forgings in the following conditions: (A) Heat treated (annealed with a controlled cycle); (B) heat treated to Brinell hardness just within the practical machining range; and (C) heat treated as above and rough machined.

The following specifications 3E, 3H and 3K are typical examples of such purchasing specifications for standard steel forgings:

Specification No. 3E

Grade: SAE 4145 standard analysis is acceptable. However, a carbon content of 0.43 to 0.48 is desired.

(CONTINUED ON PAGE 65)

U.S.S.R.

AN ideological state depends on armed force to keep the people in subjection. Concurrently, the size of the armed force is plainly dependent upon the solidarity of the people with their government or the issue at stake, as well as the area of the country thus controlled. This ideological situation invites a comparison between Russia and the United States.

The armed forces of the United States is well under 500,000, with an additional million at hand for reserves. The distance from east to west would approximate 3000 miles and from north to south about 1500 miles. There are about 238,000 miles of railroads, the larger percentage running east and west. The automobile transportation roads reach a total of over 10 times the railroad mileage.

The armed forces of ideological Russia are three times as great and the reserve corps 16 times those of the democratic United States. The distance from east to west is two and one-half times greater and from north to south nearly twice that to the boundaries of the United States. However the railroad trackage is less than one-quarter and the automobile roads less than 10 per cent of the total in the United States.

From the comparison of these figures it is evident that Russia, *regardless of her form of government or type of alliances,* must of necessity have a large armed force. Furthermore, because of the lack of adequate railroad transportation, which may be considered as about 30 per cent of that of the United States, it is essential that bases be maintained in the east, the west, as well as the south. As an example of this necessity, take into account the fact that the rate of delivery of troop trains from east to west, in time of war, would be limited to less than 12 trains a day (approximately 60,000 men), without any provision for transport of food rations, artillery or tank equipment. It's plainly evident, therefore, that Russia needs complete military establishments in at least three definite zones. Another vital point to consider is the speed of travel on Russian railroads. The maximum is 40 miles per hr., which means a seven-day trip from Moscow to the eastern Vladivostok section. The same or even worse conditions prevail on the western front.

It would require nearly 24 hr. for troop trains to travel from Moscow to Negorele, the border of Poland. And only eight such trains could be accommodated in a day, along with food rations, artillery, etc. And if the salient under attack was in the north, around the Bigossova district, any troop movement from Kiev (the general military base for the Roumanian boundary) would have to be transported north to Moscow and then shunted to the railroad division leading to Latvia.

Munition Facilities Scattered

Hence the railroads become an essential in considering the munition manufacturing ability of Russia, as well as in its contention of being a major military power. Because of transportation deficiencies Russia has established 13 military districts, each having its own railroad centers. These districts are an essential to the life of the Soviet because through them order and obedience to the Stalinist government is maintained.

Therefore, investigation will show that not only the borders are patrolled by the military but in the inner circles of the U.S.S.R. there functions the military to enforce the will of the ideology. Individuals that might be called the "hundred per centers" are few and far between. In comparison the true democracy does not require these enforcers of protocols or laws in such profusion as is demanded in the ideological countries.

Numerically strong means one thing, united strength and sound preparedness another. By numerically strong is meant the number of men and women that by draft or mobilization order may swell the man power to a desired numeration. United strength means that free American spirit, without the iron hand and blood-letting. And in the case of sound preparedness is meant the industrial progress that makes possible the contributions to armed force that spells victory. Man-power is badly limited without the protection of productive strength, and neither can accomplish much without a common solidarity.

It must be borne in mind that the masses in Russia are frequently at odds with government policy. This naturally affects production for the armed forces. It must likewise be remembered that Russia is a stripling in the industrial sense, and that it is impossible to scientifically project a people 50 years ahead of their time. Peasants cannot be made into mechanics by decree. And, it must not be forgotten that England, France and the United States exploited Russia with manufacturing concessions. Finally, the fact must not be overlooked that Russian temperament lends itself poorly to being cooped up in factories, foundries, forge shops, etc. The Russian is of an artistic nature that craves the freedom to sing, to dream with

*This manuscript received Sept. 15, which was some time before newspaper reports of the latest German technical migration to the U.S.S.R.

Still No Saar

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By EDMUND J. LOWRY

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vodka and to dance as he entertains at lavish dinners.

With his limitations and outlook the stuttering progress of the five-year plans becomes understandable.

Buildings, buildings and yet more buildings amaze the eyes of visitors to the Soviet. Foreign machinery on end fill these enormous modern structures. Inventory galore, supposedly ready for shipment, is stacked up on all sides. This inventory is inspected and divided into three categories: first, the best for the military; second, the passable for export; and, third, or the little that remains, for domestic use. This is no exaggeration. The Commissar of Heavy Industry, the late Ordzgenkedzie, complained bitterly at the industries of his group because the efforts had to be divided into what he called "two qualities," thus eliminating the first and most primary for political reasons.

After over eight years in the U.S.S.R. as a munitions consultant, the author is unimpressed with the Hitler-Stalin ***affaire d'amour.*** Stalin has an industrial bellyache and is not likely to kick in when Hitler wig-wags for help.*

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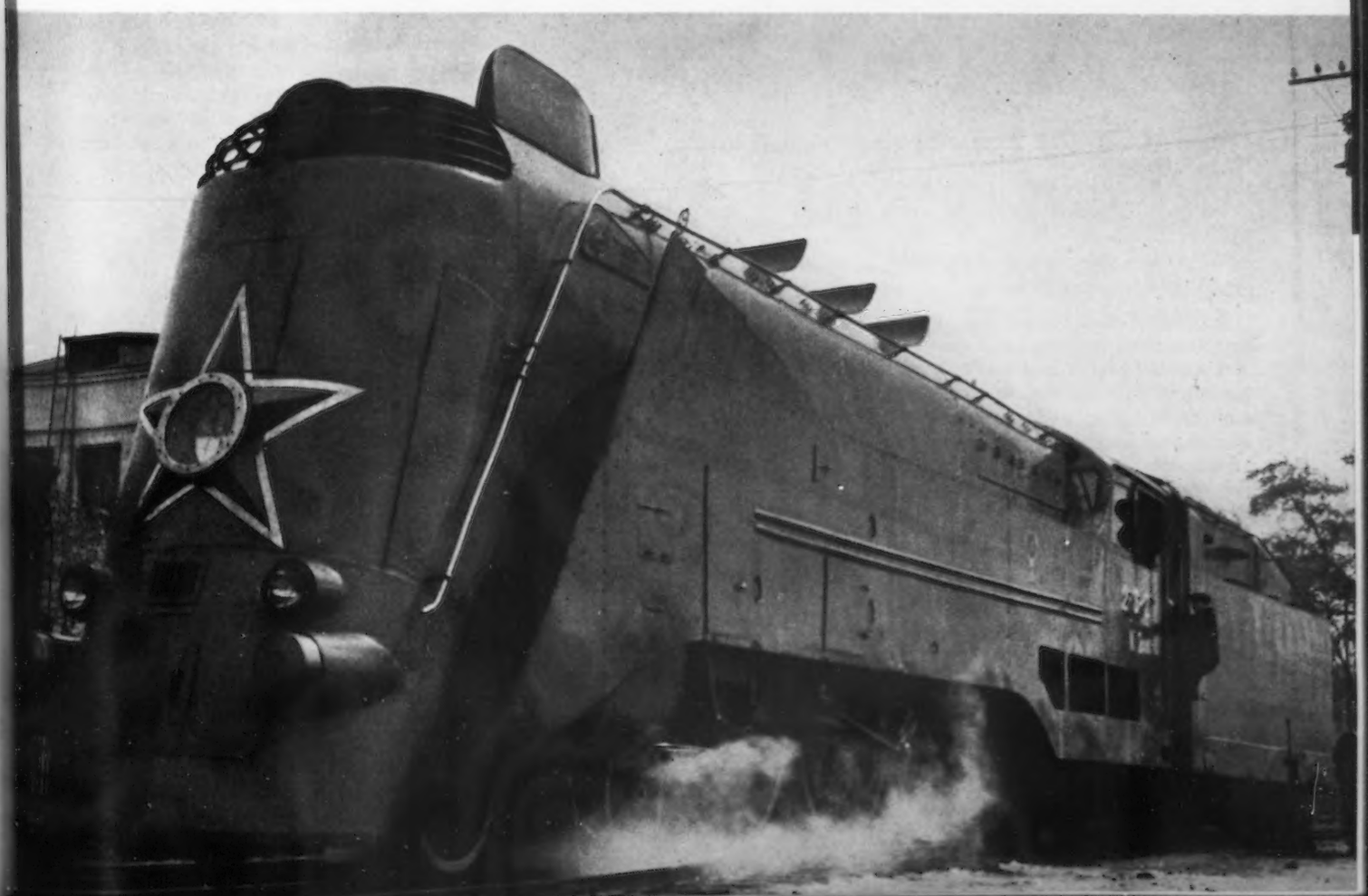
True the Heavy Industry group is not the mainstay of the army's material production, but all the factories in Russia are regimented so that at a moment's notice they may be switched from domestic and export production to the military. As already mentioned, the highest grade of materials produced are set aside for the armed forces even in peace time. The army actually commands all productive forces. There is a "secret" department, which is composed of members of the OGPU and a number of military aides, which positively controls the movements of the work in the shops. This appointed clique can go so far as to break up the normal "flow" of production and rearrange the normal layout of the mechanical equipment or devices, such as conveyors, in order that the plant can be immediately turned over to the production of cartridges, belts, leggings, etc.

"Inefficiency" Understandable

This is a major reason why some of the shops in the Soviet are constantly

A NEW type of streamlined locomotive, No. 2-3-2, turned out last year by the Kolomensky Machine Building Plant. This locomotive is now operating on the October Railroad. Photo by Sovfoto.



inefficient. Stalingrad or Cheliyabinsk, two of the world's largest tractor factories, produce only half of what factories in the United States of equal capacity can produce, the latter having much less floor area and half the labor force. But these gigantic Soviet factories could be turned over to small tank production, almost at the wink of an eye. Efficiency in these cases is partially sacrificed for the future protection of the country.

In addition to the regimented industries, the army (the entire armed forces of the Soviet) has its "secret" plants. These plants are the real munitions producers of Russia. Instead of names, numbers designate them, such as Savod 22 or Savod 28. Savod in Russian means a factory and the word is applied to any type of plant in the U.S.S.R. There are in all over 375 of these "secret" plants scattered over the country.

It will be rememeered that in the World War of 1914, Russia was the poorest equipped of all the nations. Consequently, the new regime laid great stress on the development of industries for the manufacture of war materials. This came under the heading of "defense of the proletariat." The workers gave and gave willingly to build up this fortress of strength. And the government took every advantage in accomplishing this essential project. The disadvantages, apparent from the first, were the lack of qualified technicians and skilled labor. Lenin therefore sought the aid of the Germans. These foreign engineers little understood the situation in the Soviet; nevertheless they proceeded with a will and concentrated their efforts in building the munition industry about the large cities such as Moscow, Leningrad, Kharkov, Kiev, etc. These cities are now the capitals of the western Republics of the U.S.S.R.

Stalin continued the services of German engineers in growing proportions and added German and other foreign mechanics because the Russians had not shown an aptitude for this, and as a matter of act, for any other type of industrial pursuit. As a consequence the key positions in the munition factories were not managed by Russians. On the other hand Russian women, availing themselves of their new freedom, were employed in large numbers and tried hard to master their positions. The interest and effort they displayed doubtless saved the project from outright failure. Yet, try as they might, the women could not comprehend mechanics. True they were dextrous and swift, but such attributes resolved themselves into mounting production at the expense of quality and precision.

Germans Dismissed

With the advent of Herr Hitler into German politics, a change gradually took place. Finally, because of the warring ideologies and dissension among party leaders, Stalin dismissed the German engineers and foreign mechanics from the war industries. Ironically these foreigners who had been secured for instruction purposes had been unable to impart instruction, and their departure left the munition plants a dead-end mystery to the Russians. The situation was acute and Stalin turned to the Czechs as engineers and to the Austrians as mechanics. A different strategy was immediately improvised.

The German-supervised plants were converted to other uses and new plants erected in different localities. These new plants were distributed through the 13 military districts of the country, instead of being grouped about the major western cities. Stalin could no longer afford to concentrate his military plants near the border which was accessible to a Germany growing unfriendly. The inside knowledge of the former German engineers led to the great hue and cry in Russia of "espionage" and the wild accusations against unnamed foreign governments.

The military plants are now built in cleverly hidden sections around Moscow and the chief cities of the Soviet. The present locations present a better technical decision, for each military section is practically self-sustaining from the standpoint of war materials. However, production has never been based on 100 per cent; therefore, the results are far from engineering perfection.

After Czechoslovakian occupation the Czech engineers were recalled. The few that did remain were badly handicapped because there were an insufficient number to direct the plants. A shift was made to replace the absent engineers with Austrian mechanics, who had remained in Russia because they were members of the Communist clique and were not permitted to return home. They were of an inferior type and the shift came to nothing. As a consequence the plants staggered along without supervision. Like all Soviet industries, mass production exists in munition manufacturing and, like all the industries, the latter suffers from the lack of experience and correlation. The industry has been even further impaired; for many of the Russians who gave promise of becoming excellent engineers were either accused of anti-Soviet acts or of sabotage.

"Sabotage" Is Ignorance

As far as sabotage is concerned, the writer must say that he never actually saw one case. What did happen could have been charged to acts created by ignorance or a desire to learn from investigation. Many people held and still hold that the wrecking charges introduced into the theatrically maneuvered trials *were the outcome of carefully planned movements against the government.* After eight and one-half years of close contact with the Soviet government in completing 55 projects, the writer can honestly say that the wrecking charges should have been credited to the gaining of experience in the industrial life of a mechanically backward country.

Sabotage or wrecking comes under several headings. For one, the small production achieved by a planned economic policy could be mentioned. The Savod Gorki is a facsimile of the River Rouge plant of the Ford organization. This Gorki plant was designed to produce 230,000 motors a year, with the same number of employees as the great Detroit plant. But with twice the employment it turned out only 60,000 motors. Ten per cent of the motors passing the highest test belong to the war department. The balance, up to those that fail to function, are distributed about for various uses. The Gorki plant is now being expanded to twice its original size to accommodate an objective of 250,000 motors a year. The writer was a consultant for this particular project and objected to the expansion (Izvestia, April, 1936), on the grounds that the problem of production could not be solved by size alone.

The airplane industry is a case where the present plants should be able to produce 3000 planes a month. Here again are the same paralyzing conditions of quota shading off into wishful thinking. And these plants are dominated by American specialists who hold concession rights granted by the Soviet government. Yet the maximum production is less than one-third of the rated capacity and the hours in the air discredit even this production. Tanks fall into a similar category. Well housed and equipped for production, this industry shows a production rate that baffles the engi-

neer, for quota is approximated but performance is disheartening.

The American norm is a mystery to Russians. The Stakhanovite movement, which simulates the old piece work system of America, was loudly heralded as the solution to all deficiencies in production but it failed to do much more than stimulate the workers to greater and poorer output. Russians on the general average produce about 40 per cent of that of an American artisan and the scrap heap is from 4 to 20 times greater. Therefore, it is easy to understand why they believe that larger plants and more workers will accomplish the desired results.

In the munition field, requested competitive tests of foreign equipment proved that the Soviet scored 55 per cent against the American equipment. This test encompassed mobile equipment guns, rifles and chemicals. For an example Soviet mis-fires were over 45 per cent, or about the equivalent of American mis-fires back in 1916. The condition persists because there is no real technical aid available. Furthermore, the peasant has not been trained to the accurate boring of a rifle to 0.001 deg. Explosives are uncertain. The present munition chemist must rely upon data sometimes 20 years out-dated. And the Russian technologist, lacking proper supervision, is frequently lost in a mass of instructions that mean nothing to him.

In many ways Russia is self sustaining, but is deficient in certain war materials. These necessarily must be imported. Included in this group are purified copper, purified aluminum, nickel, molybdenum, tin, graphite, nitrates and zinc. These, of course, are essentials in the munition industry. Another shortcoming is disclosed by the importation of high grade steel. Russia has one reliable plant in this respect but its production is practically consumed by the railroads. Germany, England and the United States have all exported high grade steel from time to time to the Soviet.

Consulting the export and import lists of Russia will lay the ghost of the Soviet being self sustaining at the present time. The writer recently noted that sleeves for airplane motors were imported and other items that he was unaware of, such as raw material which they possess in known quantities.

Russia has bountiful supplies of natural resources and she should emerge from the sticky condition she is in—if her ideology permits. The non-aggression pact with Germany, if continued, will doubtless assist in correcting many of the faults in production. German technicians and mechanics will greatly improve matters. *Probably an exchange of raw materials for technical aid is visualized in this pact.* The democracies can well suspect such a course, with the full knowledge that it indicates an expanded danger. At the present time Russia needs her munitions for home use. She can't afford to jeopardize the safety of her borders nor risk the hazard of domestic revolution by depleting her own marginal needs. Hitler was well aware of this before he entered into the pact, and it's safe to assume that he will do something about it.

Ideology, lack of mechanical feel, persuasive force or whatever the trouble or troubles may be, as a consultant in the munition industries of Austria, Czechoslovakia, France, Sweden, Germany and England, the writer has never come in contact with such a low equivalent in productive methods as exists at the present time in Russia. Currently, the Soviet can make no formidable contribution of munitions to any ally. During the months to come the picture can and will doubtless change.

ASSEMBLY of chassis-frames of 60-hp. caterpillar tractors on the main conveyor in the mechanized assembly shop of the Chelyabinsk, Ural, tractor plant. This plant turned out 29,000 of these machines in 1937, after which production was shifted to tractors powered by Diesel motors. Photo by Sovfoto.

EKKO PROCESS OF ELECTROFORMING

WHAT is said to be a very greatly improved method of electroforming with iron, the so-called Ekko process (the name being a phonetic spelling of echo, suggestive of the duplicating nature of the procedure), grew out of researches by the United States Rubber Co., Detroit, on the production of cheaper tire molds. During the course of this development but before tire molds were an accomplished fact, it became obvious that the procedure should offer advantages to almost all industries using molds and dies. The molds and dies so produced effect a savings for the customer or permit him to produce more ornate and attractive articles hitherto prohibited by tool costs.

The application of Ekko to other than tire molds was investigated with increasing interest and success until early in 1939 when it was decided to establish within the United States Rubber Co. a department making Ekko products available to industry at large. The Detroit plant was chosen as the site for this work as all of the original development had been done there.

The procedure produces molds and dies by electroforming iron against a pattern it is desired to reproduce. Electroforming is the same as electroplating except that deposits up to 0.5 in. thick are produced instead of the 0.001 to 0.002 in. of metal applied by the usual electroplating processes. Electroplating is used for decorative purposes or to provide corrosion resistance while electroforming is used to build up a mass of metal.

When heavy electroformed deposits of iron are separated from the underlying pattern, a cavity or die insert is obtained which has reproduced the shape and surface finish of the pattern in every detail. This cavity or die when properly mounted may be used to mold or stamp objects the exact shape of the original pattern.

The pattern is rendered conductive by dusting it with powdered graphite and polishing it vigorously with a light brush. The polishing operation adds to the finish obtained on the electroformed cavity. The patterns, of course, need not be of rubber as in the preparation of tire patterns. Provided the surface is made conducting, wood, glass, plastics, or similar materials may be used. Any metal is satisfactory with the exception of zinc and aluminum which are attacked by the plating bath.

The iron produced by the electroforming process is said to be 99.98 per cent pure and substantially free from porosity. When plated it is about 50 per cent harder than cold-rolled steel and gives a scleroscope reading of 37 or a Brinell reading of 240. The metal can be softened to the normal value of pure iron by annealing or can be hardened by carburizing so that it will scratch glass.

Electrolytic iron has a heat conductivity nearly twice that of cast iron or steel. This is stated as being a special advantage in molding operations where a high rate of heat transfer is desirable.

In the majority of instances the United States Rubber Co. intends to do all the work on the Ekko process in its own plant, although in a very limited number of cases special reasons may induce the granting of some licenses. No information whatsoever is available as to the type of electroplating bath used, other than it is a highly improved version of a bath commonly used to plate thin deposits of iron. Current densities used vary somewhat with the shape of the object, but probably average in the neighborhood of 100 amp. per sq. ft.

One of the first applications of the electroforming process to other than tire molds was the preparation of a sponge rubber hand for a young girl who had been in an automobile accident. The usual type of artificial member, fastened on with braces over the shoulder, was entirely unsatisfactory in this case as the young lady would have found it impossible to wear short sleeve dresses. For that matter, it is doubtful whether long sleeve dresses would have concealed the braces effectively. Furthermore, most artificial members are heavy, cumbersome, and expensive.

In this particular case the young lady had a sculptor friend who approached the United States Rubber Co. to determine if there was a form of rubber which could be modeled in the same manner as clay or plaster. It was explained that rubber required molding and that the mold to duplicate a rubber hand would be prohibitively expensive, however, it was also said that a process was under development for the preparation of cheap molds and the company would be willing to attempt the preparation of the required cavity on an experimental basis.

The sculptor then prepared in plaster of paris the reproduction of the missing hand correct in every detail. This reproduction was used as a pattern to electroform an iron mold. Before molding the rubber hand, an insert corresponding to the stump on the injured arm was placed in the mold so the rubber cured around it. After the preparation of the hand the insert was removed leaving a cavity which was a perfect fit for the stump. The hand, made of sponge rubber, which provided lightness and sufficient resilience, was tinted to match the natural coloration in the skin. The gauntlet type mounting required no straps or braces but permitted the wearer to open doors and drive a car.

Since the successful preparation of the sponge hand mold which indicated the desirability of electroforming in the rubber industry, the Ekko process has found application in the plastics, glass, embossing and metal stamping industries.

The simplest case is that of the radio dial shown in the photograph at the top of the opposite page. Using a bakelite radio dial as a pattern the cavity shown at the right was electroformed. The plated metal is approximately 0.25 in. thick and can be mounted for use by machining the back to a suitable shape and inserting the electroformed cavity into a steel block which has been hollowed out to

receive it. The other half of the mold is not shown but could be prepared and mounted in the same manner. The dial scale and numbers are raised in the mold, a condition which is difficult and costly to obtain by engraving as the metal surrounding each scale division or number must be cut away leaving the raised portions. By the electroforming process raised letters can be produced as easily as those depressed below the surface.

The next sample (middle photo, opposite page) illustrates the important points in the application of Ekko to the preparation of dies and forces. A plastic brooch A was used as a pattern upon which to electroform the cavity shown at B. It was then decided to prepare a punch or force to match this die so that the brooch shape could be stamped in metal 0.015 in. thick. To do this the cavity B was returned to the plating tank and 0.015 in. of non-adhering iron C was plated. The new surface created was then treated for non-adherence and the force shown at B was plated, obtaining a sort of sandwich of B, C and D.

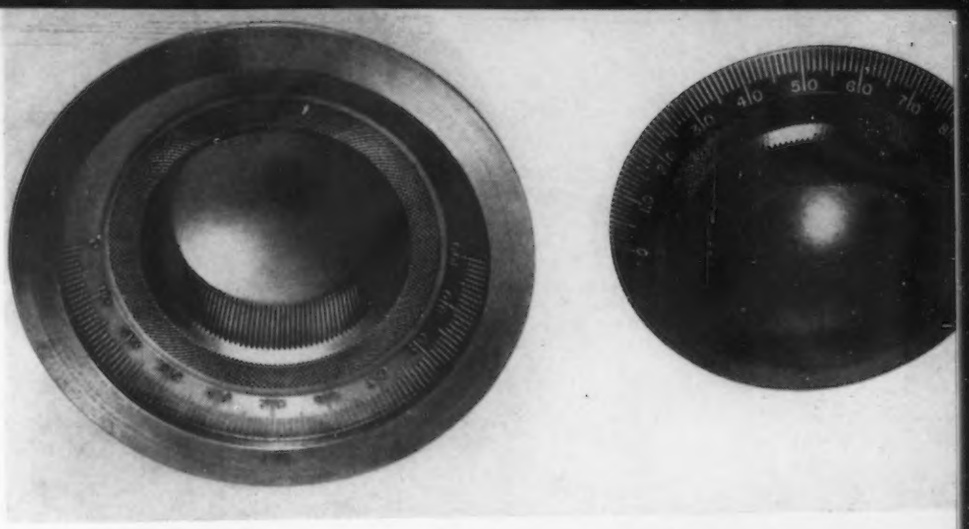
The photograph shows the sections after separation and the die B and force D now have the proper clearance to stamp metal 0.015 in. thick. It is quite possible to make the die and force for a die set by starting with any one of the three pieces corresponding to B, C or D. It is not quite possible to carry great detail through to the electroformed die or force when the intermediate section (C in the sample) is 0.025 in. to 0.030 in., but the detail is adequate especially when the same detail is seldom required on both halves.

The bottom photograph shows a die and force electroformed directly from a handmade bon-bon dish. Dishes such as that used for the pattern for these dies owe considerable of their value to the fact that they are handmade and contain small imperfections and tool marks left by the craftsman.

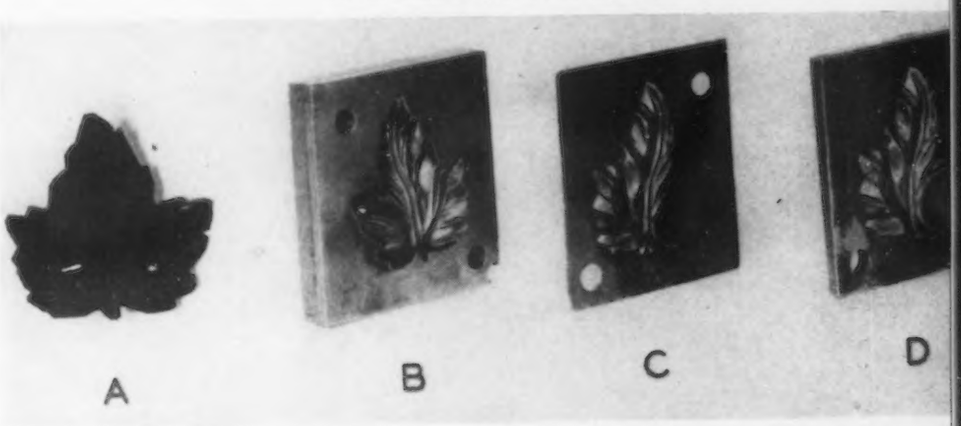
Electroformed dies made from such patterns contain all the marks of the handmade articles and can, therfore, produce in simple stamping operations exact duplicates of dishes made by hand. For stamping soft metal dishes these dies can be mounted in a satisfactory manner by casting zinc alloys on the back.

When warranted, a pattern can be started in a nickel plating bath and after the deposition of a layer of nickel, plating can be continued in the regular iron bath. Nickel is slightly harder than pure iron and this combined with its non-corrosive properties makes it ideal for many molding applications.

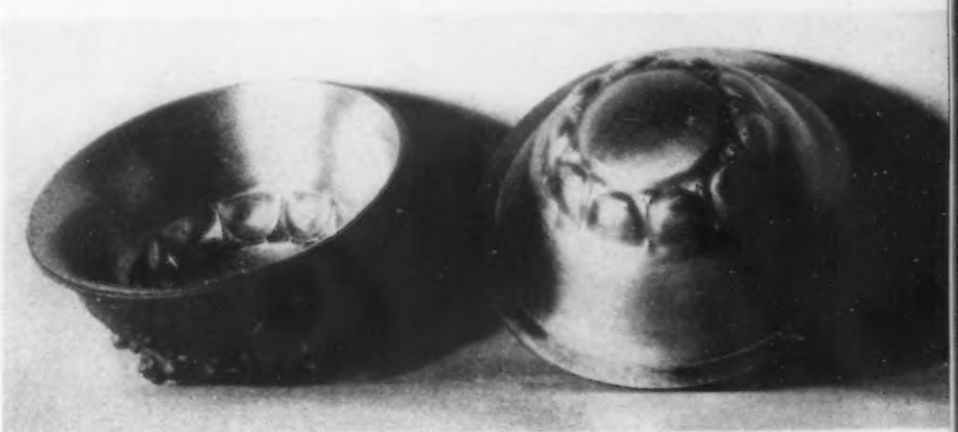
When the pattern consists of a porous material such as leather, it is undesirable to place it directly in the hot iron bath as shrinkage and distortion will take place. In these cases the nickel bath can be used to advantage since it is operated at room temperature and the leather is more resistant to the electrolyte. Nickel faced molds are many times desirable in plastic molding and are usually obtained by plating 0.001 in. or 0.002 in. of nickel into the finished cavity. This naturally causes a slight alteration in dimensions unless provision has been made for the nickel when the cavities were engraved. With the method outlined in the previous paragraph a much heavier nickel face can be applied to a cavity without altering the dimensions.



A SIMPLE case of electroforming. However, the raised numbers if engraved would be very expensive. The electroplate is about 0.25 in. thick, and the back is machined to fit into a block.



A DIE set made from a plastic brooch by the Ekko process.



A DIE set electroformed directly from a handmade bon bon dish.

Aluminum from Novelties to Structural Shapes

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By ADOLPH BREGMAN
Consulting Engineer, New York

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EIGHTH of a series of articles dealing with "The Right Metal in the Right Place", designed to aid manufacturers in selecting the most suitable non-ferrous metal or alloy for their products.

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ALUMINUM is a comparative newcomer among the metals of today, but in its short history of 50 years from the development by Hall of the first commercial process for its extraction, it has come up to fifth place in tonnage produced. In 1937 the United States produced 292,681,000 lb. of virgin aluminum with a value of $55,609,000, and 125,120,000 lb. of secondary metal worth $23,773,000. The industries which consumed this enormous output were: Transportation (land, air and water), 33 per cent; machinery and electrical appliances, 11 per cent; cooking utensils, 16 per cent; electrical conductors, 12 per cent; iron and steel metallurgy, 4 per cent; chemicals, 6 per cent; food and beverages, 4 per cent; building, 6 per cent; and miscellaneous, 8 per cent. Aluminum has become one of the important members of our industrial structure.

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ALUMINUM spots inside the corks protect the beverage from contamination, while the decorative foil around the bottle neck gives the product an attractive appearance.

The striking property of aluminum which originally recommended it and which is just as important today is its light weight. Having a specific gravity of about 2.71 it weighs about one-third as much as most of the other generally used metals.

But a number of other qualities make aluminum "the right metal for the right place." It has high resistance to atmospheric corrosion and the attack of a number of acids. It has good electrical and thermal conductivity. Its comparatively low melting point and ease of fabrication reduce cost of manufacture. Its high reflectivity of radiant energy and its strong reducing action at high temperatures make it valuable in a number of special processes.

Commercial aluminum runs about 99.2 per cent pure, the balance consisting mainly of iron and silicon. In step with the times, however, it is being produced in a 99.99 per cent grade for special corrosion resistance, an outstanding quality of this grade of aluminum. Also in step with the times, aluminum appears in a large number of alloys, so many as to make the choice of the "right" alloy extremely difficult for any but the expert.

Aluminum is fundamentally not a high strength material, this property being achieved by alloying with other metals, copper, zinc, nickel, chromium, iron, manganese, magnesium and silicon, singly or in various combinations. The total of these alloy additions is generally under 7 per cent, especially in the wrought forms. Recent years have witnessed the development of an increasing number of heat treatable aluminum alloys, cast as well as wrought, in which the strengths are far above those heretofore obtained, and which, consequently, have found a host of new uses[1].

Aluminum can be joined by riveting or welding, the form of welding depending upon the alloy involved, either oxy-hydrogen, oxy-acetylene, electric arc welding or electric resistance welding.

The chemical properties of aluminum are distinctive, but they are based largely on one outstanding attribute—the formation of a dense, tight, inert film of oxide which forms instantly when the metal is exposed to the air. This film is self-protective, preventing further oxidation and effectively stopping corrosion. Aluminum is resistant to attack by a considerable number of chemicals and it is successfully used in equipment for manufacturing, handling and storing nitric, citric and glacial acetic acids, rayon, gelatin, formaldehyde, sulphur compounds like H_2S (but not sulphur acids), hydrogen peroxide, alkali metal chlorides, ammonium salts (except chlorides, bromides and iodides), and many organic compounds (except those containing chlorine, bromine and iodine).

Moreover, the compounds of aluminum are colorless and consequently do not affect the color of the materials with which they may be in contact. So, it is used with varnish, synthetic resins, cosmetics, white mineral oils and other products which must keep their clear light color. In brewing, aluminum is non-toxic and does not affect the yeast cultures.

By virtue of its chemical properties, therefore, aluminum has become a vital factor in chemical manufacturing equipment.

Aluminum has an electrical conductivity rated at 61 as compared with 100 for copper. High thermal conductivity, together with light weight and inertness to food products, have resulted in widespread use for cooking utensils.

Not so generally known but of real industrial importance is its ability to act as a good reflector for radiant energy throughout the entire spectral range. Telescope reflectors use thin films of aluminum; light reflectors are made of aluminum. Its use in reflectors has been enormously stimulated by the Alzak finish produced by an electrolytic process, which gives a

X-RAYING an aluminum casting to determine its solidity. This test is being made in the research laboratory of the Cleveland works of the Aluminum Co. of America.

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[1] Many of these alloys and methods of heat treatment are covered by patents.

highly lustrous surface together with a transparent, hard oxide coat which is easily cleanable and resists weathering. Its low emissivity for thermal radiation makes it useful for thermal insulation, in the form of foil, separated by air spaces.

Aluminum has a very high heat of combustion and a very high affinity for oxygen. These properties are used in the Thermit process, for example, in which mixtures of finely divided aluminum and oxides of iron and other metals produce at high temperatures, metals and alloys of high purity. It is for the same reason, an important aid in the production of iron and steel, acting as a strong deoxidizer in the melt and producing steel substantially free from gas.

Forms and Alloys

The specific individual uses of aluminum and its alloys are so great in number as to make a complete listing difficult in almost any space. They can, however, be grouped, as to form (cast or wrought) and by alloys, for various classes of applications.

The important casting alloys number about 20, of which several are heat treatable, with tensile strengths ranging from 19,000 to 44,000 lb. per sq. in., elongations up to 12 per cent and Brinell hardnesses from 40 to 100[2]. There are about 20 wrought alloys obtainable in the form of sheets, plate, wire, rod, bar, rolled and extruded shapes, tubing, pipe and forgings. Many of these alloys also are heat treatable and obtainable in different hardnesses and tempers. A valuable combination known as Alclad, consists of a strong aluminum alloy clad with about 5 per cent of high purity, corrosion resistant aluminum on each side. The wrought alloys range in tensile strengths from 13,000 lb. per sq. in. for the annealed commercially pure aluminum to 68,000 for the heat treated alloy containing 4.2 Cu, 0.5 Mn and 1.5 Mg.

Elongations run from 4 to 45 per cent, and Brinell hardnesses from 23 to 116.

Aluminum Castings

For castings, present day practice calls for the use of alloys containing copper, zinc, silicon, iron, nickel, manganese and magnesium, some singly, some in combination. Castings are made in sand, permanent molds or as die castings. The permanent-mold process is a convenient method of producing practically finished parts, eliminating much of the machining necessary on sand castings, pouring the metal by gravity into iron molds. This process is used to a greater extent than in any other field for the production of automobile pistons. Die castings in aluminum alloys are used for thin-walled castings. They have close accuracy of dimensions and a fine-grained structure.

The aluminum-copper alloys are probably the most important division of the casting mixtures. The best known is No. 12, consisting of 8 copper, balance aluminum; but this mixture has been improved by additions of about 1 per cent iron and 1 to 2 per cent silicon or zinc. Typical applications are crankcases, oil pans, housings, manifolds and various fittings in automobiles, parts of washing machines, vacuum cleaners and business machines. The heat treatable casting alloys carry about 4 per cent copper with varying amounts of silicon and iron and not less than 93 per cent of aluminum. They have superior physical properties and good corrosion resistance, and are used for aircraft, marine, automotive, diesel engine and railway car castings.

Aluminum-silicon alloys, ranging from 5 to 13 per cent silicon, form a most important group. (Next to copper, silicon is perhaps the most useful alloying element for aluminum.) They were made commercially practical by the development of a process called "modification", which consists of the addition of small amounts of sodium to the molten alloy just before casting. This group of alloys has excellent casting properties, fluidity and freedom from hot shortness; high resistance to corrosion, low thermal expansion, high heat conductivity and high electrical conductivity. They are widely used for thin section castings in marine and automotive work; for water jackets, steam radiators and manifolds; in the form of permanent mold castings and die castings; for ornamental castings for fine detail, and in parts subjected to atmospheric corrosion.

Aluminum-magnesium alloys, carrying generally up to 10 per cent magnesium, have excellent resistance to salt spray and atmospheric corrosion, especially when made with high purity metals. They are more resistant to alkaline corrosion than any other aluminum alloys, the improvement increasing with the magnesium content. In heat treated form they develop the highest tensile strength of any aluminum casting alloy in present day commercial use—up to 44,000 lb. per sq. in. Elongations run to 14 per cent and Brinell hardnesses to 85. Present day uses include truck frames, motor housings, automobile body fittings, sanitary dairy equipment, pipe fittings and ornamental castings.

Other combinations and typical uses for aluminum castings include aluminum - copper - iron - magnesium (automobile pistons); aluminum-silicon - copper - magnesium (water cooled cylinder heads, jackets, cylinder blocks and exhaust manifolds); aluminum-silicon-magnesium (pressure-tight castings); aluminum-silicon-copper-nickel-magnesium (automobile and aircraft pistons).

Aluminum-zinc mixtures were formerly in wide use but have since been largely replaced in the United States by the alloys described above.

Rolled Aluminum

Aluminum is produced in about 20 alloys in the form of rolled, drawn, extruded and forged shapes, many of which are heat treatable. The principal alloying constituents are copper, silicon, magnesium, manganese and nickel. In this group are the high strength alloys which have played such an important role in aircraft, automotive parts, railroad trains, and in other structures.

Commercially pure aluminum (99.2 per cent) is generally used for chemical equipment but also to some extent for cooking utensils. Another important use for this grade of aluminum is in the form of fine powder made from flakes produced by stamping the metal down to 150 mesh, 0.00002 in. thick, for use as a pigment in aluminum paint, for protecting wood as well as metal structures.

The aluminum-manganese alloy, carrying 1 to 1.5 per cent manganese, copper maximum 0.2 per cent, and aluminum minimum 97 per cent, is easily workable and has excellent corrosion resistance. It is the leading material for kitchen utensils and is also widely used in architectural and building applications, railway car construction, furniture and chemical manufacturing equipment.

Aluminum-magnesium-chromium is used in marine and structural work wherever good workability, moderate mechanical properties, high fatigue strength and good corrosion resistance are required.

The aluminum-copper-magnesium-manganese alloys are the very high strength alloys. They have fair corrosion resistance but for severe conditions are covered with a protective

(CONCLUDED ON PAGE 66)

[2] This is the range of typical properties. Individual tests may fall below the minimum shown or exceed the maximum.

ENGINEERS DEBATE TECHNOLOGICAL ADVANCES

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WITH the iron and steel industry currently going through one of the most rapid upward movements in its history, the Association of Iron and Steel Engineers' convention and exhibition, held at Pittsburgh last week, was virtually invaded by steel engineers and operating executives coming from all points in the country. Total attendance, including technical sessions, trips, and exhibitions, exceeded 15,000, the highest total in the Association's history.

Singularly appropriate on the Association's program, was a host of papers dealing with those problems now seriously facing the iron and steel industry as it hastily attempts to put into operation iron and steel making units which have been idle since 1937, to say nothing of the necessity for quick repairs and renovations to equipment now in operation. Outstanding and up-to-the-minute in its applications was a symposium on the preparation of steel for subsequent rolling at which was discussed such features as preparation of semi-finished steel, mechanical billet chipping, oxy-acetylene steel conditioning, and billet grinding.

Equally well received were several papers dealing with coke fields from various coals, latest design in blast furnaces, and an extremely interesting discussion of a reconstructed blast furnace shell of welded design.

Electrical engineers had their inning by being presented with such important data as a detailed description of U. S. Steel Corp.'s long range power program for its Pittsburgh district mills, a discussion of a unique double bus system for power transmission at one of the Aluminum Co. of America's plants, as well as many other presentations and discussions of present-day problems.

Conditioning of Steel

Surface conditioning of steel for subsequent rolling is becoming more important all the time, due to the exacting demands of consumers, it was shown at the session of the operating practice division where four speakers outlined methods of removing surface defects.

A. P. Spooner, metallurgical engineer, Bethlehem Steel Co., Bethlehem, Pa., whose topic was "Preparation of Semi-Finished Steel," pointed out that operations involving light machine cuts, hot and cold forging methods, drastic heat treatment, and other modern trends of steel fabrication, require greater freedom from surface defects.

Causes of surface defects, he said, can be classified as mechanical, such as nicks, scratches, roll marks, or improper conditioning, and metallurgical, such as overheating, ingot cracks, scabs, ingot tears, mold action under the skin, and seams from inclusions just under the surface.

After pointing out that the amount of surface preparation depends entirely on the use intended for the steel, Mr. Spooner went on to discuss double heating, double converting, and other conditioning methods. Hand-chipping, he said, is carried out to different degrees of perfection to accommodate the desired surface on the part of the rolled or forged product. Pickling, prior to chipping, increases the cost of the preparation operation.

The necessity for flaring out cuts to prevent subsequent defects cannot be overemphasized, said the speaker.

A wide range of flexibility is afforded by the mechanical billet chipper, asserted G. W. Lentz, chief engineer, Bonnot Co., Canton, Ohio, in a paper titled "Mechanical Billet Chipping."

Large surface area per minute can be readily accomplished by the machine, he said, and carriage speeds of 17 ft. per min. forward and 34 ft. per min. in reverse, are provided. Dechucking the billet requires less than 15 sec. The tool head is designed for easy removal and tool costs are not high, while excessive heat is prevented, due to the fact that each of the tools on the multiple head completes a revolution before its next cut.

The speaker stressed that results attained with the machine vary directly with the skill and intelligence of the operator, and that these factors also bear on maintenance cost. He declared the mechanical chipper is a machine tool for the steel mill.

Hourly charges, including laborers, operator, inspector, craneman, repairs, power, tool costs, workmen's compensation and depreciation, were analyzed. Production tests and time studies as

conducted on various cross-section sizes and analyses of billets covering a rather extensive range, were given.

The vital role played by the carriage and elevator motors was described by Mr. Lentz, who offered explanation as to the various speeds relating to the tool head and the longitudinal movement of the carriage, together with the master joy stick control, designed especially for quick action. The address concluded with a motion picture showing the mechanical chipper in action.

Scarfing, or burning out the defect with the oxyacetylene torch, a method which has increased rapidly during the last few years, was described by G. D. Winlack, Air Reduction Sales Co., New York, in another paper at the operating practice session.

One of the newest developments in connection with this method is the deseaming of billets 2½ in. sq. and under, both on plain carbon and alloy steels, according to Mr. Winlack.

Several plants are using the process for hot scarfing of large defects on blooms or slabs at the mill while material is in the process of being rolled, he continued.

High speeds and the ability to salvage many stocks which formerly were scrapped due to high cleaning costs, were cited by the speaker as among the advantages of torch deseaming when compared with chipping.

Preheating or kindling of the steel facilitates the cut, said Mr. Winlack. Importance of the yard layout to insure large tonnage output was emphasized by the speaker. He offered a comparison of the yearly deseaming and chipping costs per gross ton of steel.

The flame descaling process employs the use of the oxy-acetylene torch in combination with brush type tips, which are traversed over the surface at the proper rate of speed to remove the maximum amount of scale, he said, and by means of the high temperature thus applied, a differential expansion results causing the scale to lift, crack and fly off in particles from 1/16 to 1 in. cross dimension depending on the type of steel and section cleaned. The process may also be used to supplement the pickling operation in that the greater amount of loose scale may be flame descaled and the remaining lesser amount removed in a brief pickle with acid of reduced strength.

Billet grinding is now faster, while better quality has been attained and costs decreased, said A. Rousseau, Norton Co., Worcester, Mass., in a paper titled, "Billet Grinding." With certain kinds of steel, such as self-hardening tool steel, chrome nickel, high chrome, and other alloy steels, grinding is the only really satisfactory method of cleaning the billets and removing defects, he asserted.

A. P. SPOONER
Who spoke on the preparation of semi-finished steel

The speaker outlined in detail two of the most important factors affecting the economy of billet grinding—wheel speed and grinding pressure. Rate of cut and rate of wheel wear are proportional to the surface velocity of the wheel. Wheel wear per unit of work ground remains constant regardless of wheel speed. Economy is gained through the higher rate of production. The most important limiting factor is strength of wheel, he said.

Higher pressure increases the rate of cut and, as in the case of higher wheel speed, the rate of wheel wear in like proportion. Practical gain appears to be greater with organic than with vitrified wheels and appears in the form of faster production. Here also an important limiting factor is the strength of the wheel. Fatigue of the operator must also be taken into account. Pressure must always be kept low to allow the operator complete control of the operation.

Grade of wheel is also important in economy of operation, said Mr. Rousseau.

The speaker brought out that the best wheel and operating conditions in one mill may not necessarily be the best in another mill, even though the steel is exactly the same.

He discussed safety at length and said danger of wheel breakage while in use is being constantly lessened.

In the general discussion period following delivery of the four papers, it was brought out that grinding wheel manufacturers today provide improved engineering service. One participant stressed the importance of the grinding machine itself and the importance of the operator in order to keep costs down. Mr. Rousseau, in response to a question, explained that control of pressure is largely dependent on the operator, but in some mills ballast is employed.

A considerable portion of the discussion centered upon aspects of scarfing, speeds attained in various plants, and the length of time necessary to train torch operators.

Heavier collars on torch tips facilitate tip life, said Mr. Winlack in response to a question. He said that in recent months steps have been taken to remove features of scarfing which some persons held to be objectionable and that flash removal is the subject of intensive research which bears promise of success. Other participants in the discussion brought out that many fuels are available for scarfing.

Mr. Spooner was asked if there is a relationship between sulphur content and reconditioning costs on the same grade of steel, and replied in the affirmative.

Proper Heating of Steels

Metallurgical investigations showing the value and importance of soaking pit time were reported by E. E. Callinan, combustion engineer, and Gilbert Soler, director of research, steel and tube division, Timken Roller Bearing Co., Canton, Ohio. This paper, titled "Observations on the Heating of Steels from the Metallurgical Viewpoint," was presented at the session of the combustion engineering division.

The relationship between heating of alloy ingots and surface defects was illustrated, and it was shown that except where an alloy has produced a change in the structural properties of the ingot, the temperature is predominantly a function of the carbon content. The authors showed how conductivity value changes as the alloy content changes. The surface temperature of steels of low thermal conductivity quickly reaches equilibrium with the heat source. The early stages of the heating cycle necesitate care and control. In certain instances

higher temperatures bring better surface conditions.

The authors emphasized other factors resulting in surface defects, such as variables in melting, and the handling of the heat prior to delivery to soaking pit.

Chipping costs per man-hour as the result of various heating periods were illustrated by several charts of typical alloy steels. The paper concluded with photographs of types of bloom surface defects and a discussion of their causes.

In the general discussion period which followed Mr. Callinan's presentation of the paper, participants contrasted schedules of low carbon steels against data on alloy steels presented by the authors.

One significant aspect of the discussion was contemplation by some of the engineers present as to whether soaking pit operators might not be forced to go into speedier cycles now due to the impressive demand for high tonnage output and the need for low costs.

Discussion following a paper at the combustion engineering session by Messrs. J. S. McDowell and J. P. Bankson, Harbison-Walker Refractories Co., Pittsburgh, titled "Types and Selection of Refractories for the Steel Plant" centered on uses of metal cased brick. One participant asserted this brick in furnace roofs had reduced the number of necessary patches, and other persons cited employment of it in front furnace walls.

Super-duty brick in the opinion of another participant is more economical in places where the user is apt to run into trouble, while second quality brick is resorted to where there is more reasonable assurance of safety. Insurance of continuous operations offsets the higher cost of the brick, it was said

The importance of furnace design to permit the use of low cost refractories and the desirability of standardizing on a minimum number of shapes, were other topics of discussion. It was pointed out that new furnaces with a very high rate of heat input will provide a severe test for refractories.

Use of basic brick pays big dividends under certain conditions, said one engineer. Europe has shown an advanced trend toward the use of basic brick for furnace roofs.

Welded Blast Furnace Shell

Of particular interest to blast furnace men who are currently having their troubles with furnaces which are now being put in shape to resume operation after being idle for some time was a highly interesting paper by J. L. Gould, assistant chief engineer, construction, Bethlehem Steel Co., Bethlehem, Pa., who gave in detail data covering the reconstruction of a blast furnace shell by welding.

HJALMER W. JOHNSON
Who gave interesting details regarding Inland's new blast furnace

Because the lining was too thin at an area between 10 and 20 ft. below the wearing plates on blast furnace "F" at Bethlehem Steel Co.'s Maryland plant it was decided to erect a new shell from the mantel to the hemispherical top. Mr. Gould pointed out that the operation was carried on successfully while a regular relining of the furnace was in progress.

This shell, the author said, was electric butt-welded except at the joint at the top. Plans were made so that the new shell plates were erected around the existing shell plate and the whole load of the top and downcomers was transferred in steps to the new shell. The old shell was then dismantled from the inside.

In discussing the work carried on inside of the furnace, Mr. Gould stated that when all the stock, brick, and salamander were removed, a tight scaffold was placed inside at the mantel. By the time the bricklayers had finished all but the last three feet of the bosh, the steel work was finished. Thus he said only the time required for placing and removing the scaffold was lost on the lining.

It was the author's opinion that the use of welding on this project was of sufficient success that he felt all future jobs should be done in this manner.

In attempting to give members an idea of the cost involved in such a reconstruction job, hours required and material used were given instead of the money cost because of the variation in costs from plant to plant and company to company. Fabrication of shell plates and platforms required 4400 hr. at the structural shop; erection in the field required about 2600 hr. for the riggers, about 3200 hr. for structural workers and about 2500 hr. for welders. Total man-hours on the job, including tearing out the old shell, amounted to 13,500. Material used, the author said, included 200,000 lb. of shell plates, approximately 5000 lb. of welding rod and 90,000 lb. of platform, etc. The author concluded by saying the results of this adventure were only made possible by the complete cooperation between the various departments in the mill.

Another interesting paper to blast furnace men was a complete description of the design of the new Inland blast furnace given by Hjalmar W. Johnson, superintendent of blast furnaces, Inland Steel Co., Indiana Harbor. The construction of this furnace has created considerable interest throughout the blast furnace fraternity and the author gave in detail the company's experience on this project. Data similar to that presented to the Association members can be found in THE IRON AGE, issue of Aug. 31, 1939, pages 28 to 31.

Coke Yields

J. D. Davis, senior fuels chemist, Bureau of Mines, Pittsburgh, presented a comprehensive paper, accompanied by a multitude of slides, discussing the yields of coke and by-products from various coals. He pointed out that the aim of the method used by the Bureau of Mines in arriving at its conclusions was to compare the carbonizing properties of different coals by the same procedure rather than to duplicate exactly the performance in any given type of carbonizing plant. Studied especially, the author stated, was the effect of artificial weathering on carbonizing properties of coal.

High temperature carbonization tests for groups of low-volatile, medium-volatile, high-volatile, A and high-volatile B coals respectively that were selected for comparison, gave

the following average yields of products on the moisture, and ash-free basis: Coke, 83.3, 75.6, 70.0, and 64.1 per cent; tar, 4.4, 11.4, 15.5, and 13.5 gal. per ton; gas, 2910, 3180, 3500, and 3520 Btu. per lb. of coal carbonized; light oil 1.38, 1.86, 3.35, and 3.37 gal. per ton; ammonium sulphate, 17.1, 19.4, 20.2, and 27.6 lb. per ton. The author concluded from the above that the variation in products obtained with rank of the coal is fairly regular and stated that the strongest coke was obtained from the medium-volatile coals, although that from the low-volatile coals was almost as strong. The best gas, he said, was obtained from the high-volatile A coals which are known industrially as gas coals.

Carbonizing temperature, the author held, has a pronounced effect on the yields and properties of carbonization products. In covering the results of weathering on coal, the author said that in general it gradually destroys the coking power of the coal but with high-volatile coals moderate weathering may be beneficial. He stated that a good index of the extent to which a coal has weathered is the decrease in the yield of tar.

During a general discussion of Mr. Davis' highly technical and valuable paper, it was pointed out that members should remember that these Bureau of Mines tests should be interpreted in light of laboratory conditions. While one could not predict specifically from these results, it was stated with authority that these studies showed definite trends and members should have no fear of their reliability when used in their own calculations and programs.

U. S. Steel's Power Program

In a clear-cut discussion of the transition from 25 to 60 cycle power in the steel industry, W. B. Skinkle, secretary and engineer, Pittsburgh district power committee, U. S. Steel Corp. subsidiary companies, described specifically the position of the U. S. Steel Corp. with regard to power in the Pittsburgh district previous to the building of a large continuous strip mill. He pointed out that companies operating 25 cycle systems find themselves more and more in a position of operating isolated power systems. Up to 1937, he said, U. S. Steel Corp. plants in the Pittsburgh district located in the lower Monongahela Valley used 25 cycle power for their main electrical supply, 60 cycle power being utilized only at a few places where small quantities were purchased. With power becoming a major factor after it had been decided to build a large continuous strip mill in the Pittsburgh district, Mr. Skinkle said that additional power supply was necessary which could be either of 25 or 60 cycles. Adopted by utility companies, the 60 cycle power system has become a recognized standard in the United States, he said. In the investigation, he added, it developed that the 60 cycle power should be used in the new strip mill operations because of considerations of cost, greater freedom in selection of equipment and selection of source of power, efficiency, and frequency changers.

Tentative plans of this system (a comprehensive long range power program) inaugurated by U. S. Steel, call for: No major additions on the 25 cycle system; the transfer of 25 cycle load to the 60 cycle system as 25 cycle generating equipment is retired from service; and the 60 cycle system will be extended for all new major additions.

D. C. BOHN
Who described the double bus system for power transmission at the Aluminum Co. of America plant

For an economical changeover, he said, the transition period will probably extend over 25 years and predicted that occasions will arise where a change may entail a temporary loss until the economies of the complete program are available. The economical shifting of loads and the maintenance of uninterrupted production during the transition period in U. S. Steel Corp. mills in the Pittsburgh district present many problems, the author said. He added, however, that study has developed plans whereby a series of steps may be arranged over week-end periods involving no general plant shutdowns.

Although such changes naturally result in "mixed cycle" plants, Mr. Skinkle stated that experience in plants having this condition indicates no more reason for confusion than might exist with pipe lines for various services or with the a.c. and d.c. systems installed in all steel plants.

Of exceptional interest to Association members was the discussion of a double bus system for power transmission by D. C. Bohn, electrical engineer, Aluminum Co. of America, Pittsburgh, and J. E. Housley, superintendent of power, Aluminum Co. of America, Alcoa, Tenn. According to the authors, who were describing a system now operating in Aluminum Co. plants, power transmission systems vary widely, principally in the extent to which flexibility of switching to meet all assumed conditions is carried. The Alcoa power system, they said, comprised of 265,000 kva. of generation in three power houses, feeding a normal load of 200,000 kw. to the reduction plant, leans in the direction of simplicity.

While displaying the wiring diagram of this system, the authors said that it is essentially, in its electrical features, a double bus supplied from three power houses. Each power house constitutes a tap on the transmission system, and, they said, may be considered as a bus inasmuch as the transmission lines do not move in and out of the power house.

Despite the fact that there are certain switching combinations to take the equipment and lines out of service that cannot be done to the extent that a loop system would permit, the authors say that it is the opinion of the operating personnel that the problems presented by this slight lack of flexibility have been less important than the problems which would exist due to the complexity of the looped-in switching system.

H. L. Palmer, electronic section, and H. W. Poole, steel mill section, General Electric Co., Schenectady, were joint authors in the presentation of a comprehensive paper on vacuum tube control for steel mill application. While electronic control is not a "cure-all" for everybody's troubles, the authors believe that it has a definite place in industrial plants. After describing the various general applications of electronic tubes and electronic devices, the authors reviewed the basic principles involved.

Turning to a discussion of electronic applications which have already been successfully made in the steel industry, the authors pointed out that in one classification are to be found photoelectric tubes, gas filled tubes, and high vacuum tubes.

The authors discussed the applications of the photoelectric tubes, discussing in detail such applications as limit switches, photoelectric pyrometers, and pin hole detectors.

In the field of gas filled tubes, applications were described involving motor control, resistance, welder control, temperature control, and battery chargers. Applications involving the use of vacuum tubes such as timers, were also described by the authors, and their talk was summarized by a detailed presentation of applications made in industries other than the steel industry.

Modernization of Open Hearths

In the midst of the grand rush on the part of many steel producers to rapidly renovate open-hearth furnaces which have been idle for some time, intensive interest was centered on a paper by G. L. Danforth, Jr., president, Open-Hearth Combustion Co., Chicago, who spoke on "Modernization of Existing Open-Hearth Furnaces and Auxiliary Equipment." Numerous features, he said, now available for consideration and possible use in the work of modernizing any open-hearth plant vary greatly in the amount of expenditure required for their installation, the value of the operating improvements accomplished thereby, and in the amount of expenditure relative to the amount of savings. In commenting on these features, Mr. Danforth spoke in detail concerning modern design of ports, checker work, roofs, doors, frames, and insulation, saying that they require little or no additional construction cost when applied to the existing furnace at any time it is relined. He told members also that a substantial return on expenditures can be obtained by modernizing furnace combustion controls, straight line flues and valves, molds, and the installation of sloping back walls.

Major expenditures, he said, are required to materially enlarge the size of the open-hearth furnace for tapping larger heats and to provide equipment for handling such heats.

In discussing these features available for modernization purposes, Mr. Danforth grouped existing open-hearth plants in four classes: quite modern, semi-modern, semi-obsolete, and quite obsolete.

The quite modern group he classified as open-hearth plants built within the past eight years, semi-modern group being those built some 15 years ago, the semi-obsolete group comprising those built some 20 years ago, and the obsolete group as ancient plants producing small heats with equipment which was installed originally. As suggested by these classifications, the cost increases as one goes down the list, and in the quite obsolete group, the speaker said there are plants which should be completely abandoned because of the excessive outlay of money required to bring them into a better productive position.

Pointing out that modernization is a continuous process, Mr. Danforth said that with improvements continuously being developed and made available for use, even the open-hearth units now classified as modern will be subject from time to time to alterations or additions.

In concluding his talk, Mr. Danforth told members that modernization of open-hearth furnaces and auxiliary equipment is of much importance to the ever-expanding steel industry, requiring more production, lower costs and better quality; and stated that every plant should have on hand and execute a well planned program of modernization because it will pay dividends in production, quality, and cost.

Welding Problems Discussed

Participating in a well rounded and interesting session of the welding engineering division, Wray Dudley, assistant superintenent of maintenance, National Tube Co., McKeesport, Pa., presented a preliminary report concerning experience gained during the past year in welding crane runway rails.

Mr. Dudley presented data showing characteristic rolling loads in different types of service, illustrated the nature of failures usually encountered, and described the various weld procedures for repairs and replacements which were attempted, including the building up of low and battered ends and the making of semi-continuous and solid welded joints.

During the course of his paper, Mr. Dudley furnished service results as well as cost of the various groups of welds and attempted to evaluate the economic use of welding for crane rail applications.

Before describing one of the more recent developments in the atomic hydrogen welding process, J. T. Catlett, General Electric Co., presented a general history of welding.

When this process is utilized in an automatic welding machine, Mr. Catlett said there are four factors which must be held as nearly constant as possible if a uniform weld is to result. The welding speed and the vertical relationship between the welding head and the work are relatively simple mechanical problems, while maintaining a constant value of arc current is a simple electrical problem. The fourth factor, he said, is the size or length of the arc. The solution of this last factor, he said, is based on the fact that the length of the electric arc and the voltage drop across it bear a definite relationship.

In presenting his paper on welding electrodes and their applications, J. H. Deppeler, chief engineer, Metal & Thermit Corp., New York, described in detail the proper selection as to analysis and particle size of electrodes for welding iron and steel. All electrodes are carefully selected so as to: Vaporize or burn and thus shield the materials being transferred across the arc from the oxygen and nitrogen in the atmosphere; offer sufficient resistance to fusion to create and maintain on the end of the electrode a symmetrical and inverted crucible neither

Iron and Steel Engineers Elect New Officers

NEW officers chosen by the Association of Iron and Steel Engineers at its convention in Pittsburgh are: President, J. A. Clauss, chief engineer, Great Lakes Steel Corp., Ecorse, Mich.; first vice-president, W. A. Perry, superintendent, electrical and power departments, Inland Steel Co., Indiana Harbor, Ind.; second vice-president, T. E. Hughes, superintendent, maintenance department, Carnegie-Illinois Steel Corp., Duquesne, Pa.; Treasurer, Frank Flynn, district manager, Warren, Ohio, plant, Republic Steel Corp.; and secretary, J. L. Miller, assistant combustion engineer, Republic Steel Corp., Cleveland.

too deep nor too shallow; to continuously furnish to the arc materials to control its resistance and, therefore, the arc voltage, and others to stabilize the arc, cause it to operate smoothly without wandering or spatter; and to furnish these mineral oxides and silicates which will produce on vaporization and subsequent solidification a complete dark spongy slag blanket, so light and porous that it cannot depress or deform the weld metal but with a smooth top surface completely excluding the gases of the atmosphere.

In describing thermit welding, Mr. Deppler said there are in general three uses for this process in the steel mills: The repair of broken parts, which may be indicated for economical reasons or by the saving in time in getting the mill or machine into operation again; the building up of worn parts which in many cases replaces the material worn off with one better suited to withstand the service; and the manufacture of new constructions or the making of old ones in a new way.

Mr. Deppler pointed out that the coordination of the various departments of steel mills in welding work is most important if fullest benefits are to be enjoyed.

Age and poor design, coupled with the expense required to modernize, are among numerous obstacles preventing efficient lubrication on existing equipment, said F. J. Thomas, lubrication engineer, Republic Steel Corp., Cleveland, in a paper at the session devoted to gear life. A wide variety is noted in the methods of lubricating bearings, both with oil and with grease, he said. He cited examples where one method of lubrication has been abandoned in favor of another, and explained the results.

Changes in equipment and bearing design, or in types of bearings used, are often very effective in making possible more efficient lubrication, he asserted.

During the discussion of Mr. Thomas' paper, one participant stated that old mills now being brought into production because of increased steel demand will probably be overloaded and stated that a lubricating system would ease this difficulty. It was stated that such a lubricating system could be installed on old mills without interfering materially with production and it would be possible to make this change over the week-end. One member said that the installation of a lubricating system could increase the yield as much as 10 per cent on the old mills and result in power savings of as much as 4 kw-hr. per ton.

A lubricating engineer stated that 60 per cent of present-day lubricating troubles could probably be corrected by proper applications through a careful review of methods now used. It was said also that lubricating engineers who had advocated increased budgets for this item are now having their way to a greater extent than for some time, owing to the pick-up in business. One statement challenged from the floor was that 80 per cent of all mechanical failures were due to faulty lubrication. While many members did not agree completely with the percentage stated, all agreed that faulty lubrication takes far greater toll in mechanical failures and thus loss of production than it should.

DETERMINATION OF SURFACE ROUGHNESS BY LIGHT REFLECTIVITY

DIFFERENCES in the refractive qualities of various types of machined surfaces on metal are used effectively to determine surface smoothness in a new device recently demonstrated by Insulation Development Corp., Monroe, Mich. This surface measuring device, in effect, makes use of a tracer point of light to scan the surface of a part, rather than a mechanical tracer point. It has the advantage of giving a reading of surface smoothness on a single small area no bigger than a point of light instead of giving an average reading along a line as the mechanical tracer point does in the well-known profilometer.

This surface measuring equipment consists of a few simple parts. The metallic cylinder on the right in the photograph is a shell which contains the light source, a 32-candlepower automobile fog lamp bulb. Light passes through an aperture approximately 0.10 in. in diameter and then through plano-convex condensing lenses to a point on the surface the roughness of which is to be measured. The light beam is reflected or refracted, or both, depending upon the nature of the surface. The reflected light is picked up by a selenium cell in the black container at the left of the instrument. The amount of light energy picked up by the cell is shown on a micro-ammeter.

Behind and beneath the ammeter is a rheostat for adjustment of the micro-ammeter to zero reading. This is done by calibrating the instrument against a very thin flat mirror of the type used as a reflector in high grade cameras. This has been found to give a reading of almost absolute smoothness so the rheostat is adjusted until the micro-ammeter shows maximum reflective power.

While the instrument as used at present reads in microamperes from 0 to 20, and hence is merely comparative, it can be calibrated either in terms of absolute micro-inches or root mean square value, if such calibration is desired.

In determining smoothness of metals of different colors (such as copper, brass, etc.) a light filter has been found desirable. This is inserted in a cartridge between the two lenses before the micro-ammeter is adjusted to zero. This provides for the maximum possible reading on the scale and makes it easier to differentiate between two surfaces on the same material which have slightly different degrees of smoothness.

Germany May Run Short of Iron Ore as War Progresses

LONDON — Reports that Sweden had banned the export of iron ore to Germany, which have recently been current in London, are incorrect. Actually the Swedish Government has forbidden the import of certain commodities and the export of iron ore, tool and rolled steel, and certain other products without Government permits.

The Swedish Government's object is to stabilize trade relations with foreign countries and to prevent pressure from non-commercial influences being applied to Swedish traders. At the same time the announcement that 13 German freighters recently had to leave Lulea without their expected cargoes of ore means that deliveries were held up pending the issue of export permits, though the export of iron ore to Germany or elsewhere may be strictly rationed under the permit system.

It has to be remembered also that Germany's total gold reserve is barely $25,000,000, and she has very little cash to spare for the purchase of ore. Even if Germany could pay for unlimited supplies of ore, the bulk of Swedish iron ore is dispatched from Norwegian ports and would have to run the British blockade. Consequently, Sweden cannot send Germany much more than one-half the usual 10,000,000 tons of ore annually now that, as in the last war, the Narvik outlet is again efficiently blockaded.

In 1938 three-fourths of the supply of Lapland ore was shipped via Narvik. The Bothnian port of Lulea, although icebound for five months annually, is stated to be capable of handling appreciably more than last year's 2,850,000 tons. In 1938, approximately 1,380,000 tons were shipped via Oxelosund from Central Sweden.

If Germany succeeds in obtaining the whole of Poland's ore output she will be little better off, as Poland only produces 873,000 tons per annum.

May Get Russian Ore

Alternatively, Germany could look to Russia for supplies provided financing difficulties were overcome. Soon, however, the Baltic ports will be frozen up and transport by sea will be impracticable. The only other way of bringing ore from Russia will be by train through Latvia—a hopelessly inadequate means of transport while Germany is 100,000 freight cars short of peace-time requirements.

Germany's peace-time requirements of ore total 22,000,000 tons per annum, of which she herself produces 8,000,000 tons. Before the war France and Sweden supplied her with 5,000,000 tons each per year.

Norway, Spain, the United States and Belgium supplied her with the rest of the 14,000,000 tons required from abroad. France, of course, is no longer a supplier, and the others—all neutral countries — demand cash for all shipments.

The seriousness of Germany's position is even greater than these figures indicate, as her domestic ore production is of low grade and she has always relied on imported ore for her best steel.

Poland Increasing Iron Ore Output

According to a recent British survey of Poland's raw materials, Poland has made great efforts to improve domestic supplies of raw materials for her iron and steel industry and to develop industrial districts away from the vulnerable frontier regions.

In 1929 approximately 51 per cent of the total ore consumption of 1,200,000 tons of iron ore was drawn from domestic sources. By 1937 this proportion had risen to 58 per cent of the 1,300,000 tons required. The ore mined at present is largely brown ore, often mixed with sand and lime, and with an iron content varying between 30 and 40 per cent.

It is understood that extensive deposits of workable high-grade ore have been located in Galicia and in the adjacent province of Kielce. The tonnage of ore raised in Poland in 1929 was 660,000 tons, against 870,000 tons last year.

Poland's iron ore imports reached 550,000 tons in both 1929 and 1937. In the latter year Sweden provided 31 per cent, Russia 21 per cent, Greece 11 per cent, and Norway and Germany 7 per cent each.

The consumption of scrap, principally in steel mills, but partly in blast furnaces, totals about 1,000,000 tons per annum. In 1929 about 516,000 tons of scrap were imported, and the figure rose to 643,000 tons in 1937. The largest supplier in the latter year was the United States with 32 per cent, followed by Holland with 21 per cent, Britain with 11 per cent, and Belgium with 10 per cent.

No estimates are available of the tonnages available from domestic reserves in an emergency. Hitherto most of the imported scrap has been landed at Gdynia, but the war has, of course, stopped this trade.

Poland's resources of coke and coking coal are ample and she is able to export about 350,000 tons annually. The coke output in 1937 at colliery ovens exceeded 2,000,000 tons, of which Polish iron and steel works consumed approximately 750,000 tons.

2000 Canadian Plants Surveyed For Possible War Production

TORONTO—Bookings continue heavy for finished and semi-finished steel in the Canadian markets. Prices show a firmer trend. While no announcement has been made regarding higher prices for bars, it is announced that new orders, for delivery at the convenience of producers, are being accepted at prices which will be in force at the time of shipment. Sheets have been sold to the end of the year insofar as Hamilton producers are concerned, with no booking being taken beyond this quarter. Canadian producers report no change in sheet prices and point out that any change today would not affect their sales and would not actually become effective until first quarter booking commences.

It is stated that some sheet consumers may be forced to obtain supplies from the United States. Warehouses have marked up sheet prices, galvanized being advanced $1 per 100 lb.; black sheets 17 ga. and lighter, 70c. and blue annealed, 16 ga. and heavier, 35c. The advance is to cover additional costs on imported sheets in the way of duty, freight and exchange. Warehouse operators report increasing demand for sheets, bars and various other materials.

Munitions and war supplies con-

tracts are expected to flow into the market in the immediate future, following the announcement at the week-end that the Canadian War Supply Board has almost completed its investigation of production possibilities in this country, and now has lined up more than 2000 plants prepared for immediate production, or can be whipped into shape with minor adjustments. Canadian die and tool manufacturers are running at full time rushing out tools and equipment for munitions production, while in addition some big purchases of equipment have been made in the United States and others are pending.

Large Pig Iron Sales

Advance of $3 per ton in pig iron prices, which went into effect at the beginning of last week, gave some impetus to spot sales during the week, but otherwise had little direct effect on the general market. Previous to the upturn in prices most of the large melters had covered for the fourth quarter and the advance will not affect these melters until booking starts for first quarter. The war scare brought the majority of melters into the market and bookings for fourth quarter reached the highest quarterly record in years. Officials of Steel Co. of Canada, Ltd., announced that the company has withdrawn from the market, it being understood that the company will need production, not covered by contract, for its own use.

The Algoma Steel Corp. blew in a second blast furnace at the end of September, bringing the total active stacks in Canada to seven, out of a total of 10. Steel Co. of Canada, Ltd., Hamilton, Ont., blew in its second furnace in August; Dominion Steel & Coal Corp., Sydney, N. S., has two stacks blowing, and the Canadian Furnace Co., Port Colborne, Ont., one.

Word was received from Hamilton that the Steel Co. of Canada, Ltd., has awarded contracts for new open hearth and construction to be started immediately. This is a part of the steel company's earlier announced construction program involving outlay of $11,000,000, but which had been held in abeyance pending improvement in business conditions. No annoucement has been forthcoming regarding other work in connection with the program.

Hayes Steel Products, Ltd., St. Catharines, Ont., has awarded structural steel contract for one story, 200 by 50 ft., addition to its plant to Standard Steel Construction Co., Port Robinson, Ont., and general contract to Newman Brothers, St. Catharines, Ont.

Frid Construction Co., has been awarded contract, and work will be started at once on $500,000 addition to center bay building, the west bay building, the ingot yard building and the white pickling building for the Dominion Foundries & Steel, Ltd., Hamilton, Ont. Approximately $400,000 will be expended on equipment for the new additions.

Fleet Aircraft, Ltd., Fort Erie, Ont., which recently received an order for 23 training planes for the Department of National Defence, Ottawa, has just closed an additional contract for 73 planes. This latest order brings the Fleet Aircraft business on hand to upward of $2,500,000. Two or three weeks ago Fleet Aircraft placed an order for 100 five-cylinder motors with a Los Angeles company.

Dominion Steel & Coal Corp., Sydney, N. S., is maintaining capacity operations at its steel works and with orders on hand and in prospect presages no slackening of operations for many months, and possibly years. The company also is maintaining capacity operations at its Wabana, Newfoundland, iron mines. In recent years the company has been exporting 1,000,000 tons of iron ore to Great Britain and Germany, the latter country taking about 800,000 tons annually. This market now is cut off, but it is expected the iron ore tonnage made available will be absorbed by Great Britain and there will be no reduction in the Wabana operations. The Sydney, N. S., steel works of the company have been using about 600,000 tons annually, but its requirements also are said to be gaining under the increased production operations.

Canadian Ore to Be Used

Algoma Steel Corp.'s iron mine recently brought into production at Michipicoten on the north shore of Lake Superior, will play an important part in furnishing steel for the Canadian war efforts. Sir James Dunn, president, called from Sault Ste. Marie to Ottawa during the week by the War Supply Board, assured the latter heads that the mine now is producing at the rate of 1200 tons of ore daily and soon will be increased to 1800 tons per day. Before the mine was brought into production, most of the iron ore used in Ontario steel plants was imported from the United States. This new Canadian mine development, however, is expected to supply the greater part of the ore needs for the Algoma Steel Corp., leaving the Steel Co. of Canada, Ltd., Hamilton, Ont., and the Canadian Furnace Co., Port Colborne, to import ore from the United States.

War Solves Nothing, Fairless Tells Iron and Steel Engineers

IF the lessons of 1914 to 1919 teach anything, they teach the futility of attempting to arrive at world wide gain, contentment, and economic progress through world wide conflict, B. F. Fairless, president, U. S. Steel Corp., told the Association of Iron and Steel Engineers last week at their annual banquet. Mr. Fairless, chief speaker, pleaded for the application of the objective and dispassionate method of the engineer to the solution of international problems.

Touching on the effect of the European war in the United States, Mr. Fairless said, "We know at once that a substantial derangement of the political, economic, or social order anywhere on the earth has an immediate effect upon our own affairs. Therefore, we are rightly concerned with what is now transpiring, even though that concern relates first and foremost to the maintenance of a state of neutrality. We are solicitous about what may happen, and on guard to avoid involuntary entanglement in hostilities."

Contrasting the methods used by the engineer in solving his problems, with the methods repeatedly used in the attempted solution of international affairs, Mr. Fairless said: "On the one hand there is an analysis of cause and effect, a study of the relation of part to part, a search for facts, and a building with due regard for natural laws. On the other there is a foundation of passion, jealousy, and fear, a resort to pressure politics, and a widespread destruction of life and property. Which of these methods, do you think, partakes of the essence of wisdom?"

"It is unreasonable to suppose," Mr. Fairless said, "that only with respect to matters lying outside the field of international relations can men ascertain facts, apply exact knowledge, reason from cause to effect, correct errors, and act constructively."

A Record of Prices of Pig Iron, Steel, Ferromanganese and Scrap During the First World War

DURING the past few weeks THE IRON AGE has received many requests for information as to the trend of iron and steel and scrap prices during the first World War. We publish below the monthly average prices of some of the most important products for the years 1914 to 1918 inclusive. In late September, 1917, prices were fixed by the War Industries Board, but open market conditions returned with the Armistice.

Basic Pig Iron, f. o. b. Valley Furnace

	1914	1915	1916	1917	1918
Jan.	$12.50	$12.50	$17.81	$30.00	$33.00
Feb.	13.19	12.50	17.69	30.00	33.00
March	13.00	12.50	18.20	32.25	33.00
April	13.00	12.50	18.13	38.75	32.00
May	13.00	12.50	18.00	41.60	32.00
June	13.00	12.59	18.00	48.75	32.00
July	13.00	12.74	18.00	52.50	32.00
Aug.	13.00	14.06	18.00	51.20	32.00
Sept.	13.00	14.75	18.31	42.75	32.00
Oct.	12.81	15.00	19.88	33.00	33.00
Nov.	12.48	15.75	25.10	33.00	33.00
Dec.	12.50	17.50	30.00	33.00	33.00
Aver.	*12.87*	*13.74*	*19.76*	*38.90*	*32.50*

No. 2 Foundry Iron, f. o. b. Chicago Furnace

	1914	1915	1916	1917	1918
Jan.	$13.75	$13.00	$18.50	$30.00	$33.00
Feb.	14.00	13.00	18.50	32.00	33.00
March	14.25	12.95	18.70	36.00	33.00
April	14.25	13.00	19.00	39.25	33.00
May	14.06	13.00	19.00	43.80	33.00
June	13.69	13.00	19.00	51.00	33.00
July	13.75	13.00	19.00	55.00	33.00
Aug.	13.69	13.44	18.40	55.00	33.00
Sept.	13.25	13.90	18.13	54.67	33.00
Oct.	12.94	14.63	19.63	33.00	34.00
Nov.	12.56	17.13	25.80	33.00	34.00
Dec.	13.00	18.10	29.50	33.00	34.00
Aver.	*13.60*	*14.01*	*20.26*	*41.31*	*33.25*

Open Hearth Billets at Pittsburgh

	1914	1915	1916	1917	1918
Jan.	$20.25	$19.25	$33.00	$63.00	$47.50
Feb.	21.00	19.50	34.75	65.00	47.50
March	21.00	19.70	42.60	66.25	47.50
April	20.80	20.00	45.00	73.75	47.50
May	20.00	20.00	43.40	86.00	47.50
June	19.40	20.50	41.50	98.75	47.50
July	19.00	21.88	42.75	100.00	47.50
Aug.	20.25	23.50	45.00	82.50	47.50
Sept.	21.00	24.60	45.00	66.25	47.50
Oct.	20.00	25.25	46.25	50.50	47.50
Nov.	19.25	27.25	52.00	47.50	47.50
Dec.	19.00	31.80	57.50	47.50	45.50
Aver.	*20.08*	*22.77*	*44.06*	*70.58*	*47.33*

Hot Rolled Bars at Pittsburgh

	1914	1915	1916	1917	1918
Jan.	1.20	1.10	2.03	3.15	2.90
Feb.	1.20	1.10	2.31	3.25	2.90
March	1.20	1.15	2.65	3.63	2.90
April	1.15	1.20	2.88	3.75	2.90
May	1.14	1.20	3.00	4.00	2.90
June	1.11	1.21	2.75	4.25	2.90
July	1.12	1.25	2.63	4.50	2.90
Aug.	1.19	1.30	2.56	4.30	2.90
Sept.	1.20	1.34	2.60	4.00	2.90
Oct.	1.15	1.44	2.75	2.90	2.90
Nov.	1.10	1.62	2.83	2.90	2.90
Dec.	1.07	1.84	3.00	2.90	2.80
Aver.	*1.15*	*1.31*	*2.67*	*3.63*	*2.89*

Wire Rods at Pittsburgh

	1914	1915	1916	1917	1918
Jan.	$25.50	$25.00	$43.00	$75.00	$57.00
Feb.	26.38	25.00	48.00	77.50	57.00
March	26.50	25.00	54.80	81.00	57.00
April	26.00	25.00	60.00	85.00	57.00
May	25.50	25.00	60.00	86.00	57.00
June	24.50	25.00	53.75	92.50	57.00
July	24.50	25.63	53.75	96.25	57.00
Aug.	25.00	27.00	55.00	94.00	57.00
Sept.	26.20	29.40	55.00	88.75	57.00
Oct.	25.88	31.75	55.00	77.25	57.00
Nov.	25.25	36.25	63.00	57.00	57.00
Dec.	25.00	39.50	68.75	57.00	57.00
Aver	*25.52*	*28.29*	*55.84*	*79.77*	*57.00*

Plain Wire at Pittsburgh

	1914	1915	1916	1917	1918
Jan.	1.35	1.34	1.98	2.95	3.25
Feb.	1.40	1.39	2.10	2.95	3.25
March	1.40	1.40	2.25	3.11	3.25
April	1.40	1.37	2.25	3.23	3.25
May	1.36	1.35	2.45	3.45	3.25
June	1.30	1.35	2.45	3.70	3.25
July	1.32	1.39	2.45	3.95	3.25
Aug.	1.36	1.43	2.53	3.95	3.25
Sept.	1.40	1.54	2.55	3.95	3.25
Oct.	1.40	1.65	2.60	3.25	3.25
Nov.	1.39	1.72	2.80	3.25	3.25
Dec.	1.31	1.89	2.95	3.25	3.25
Aver.	*1.37*	*1.48*	*2.47*	*3.43*	*3.25*

Tank Plates at Pittsburgh

	1914	1915	1916	1917	1918
Jan.	1.20	1.10	2.25	4.45	3.25
Feb.	1.20	1.10	2.56	4.88	3.25
March	1.18	1.10	3.10	5.25	3.25
April	1.15	1.15	3.56	5.88	3.25
May	1.12	1.15	3.75	6.60	3.25
June	1.10	1.16	3.63	8.00	3.25
July	1.10	1.22	3.44	9.00	3.25
Aug.	1.18	1.26	3.70	8.80	3.25
Sept.	1.20	1.34	4.00	8.00	3.25
Oct.	1.14	1.44	4.00	3.25	3.25
Nov.	1.08	1.65	4.15	3.25	3.25
Dec.	1.05	2.04	4.25	3.25	3.13
Aver.	*1.14*	*1.31*	*3.53*	*5.88*	*3.24*

Steel Pipe at Pittsburgh (net ton)

	1914	1915	1916	1917	1918
Jan.	$35.20	$34.20	$41.39	$64.84	$88.92
Feb.	36.09	35.42	43.63	66.95	88.92
March	36.12	36.10	47.51	72.07	88.92
April	35.54	36.10	51.25	81.51	88.92
May	35.20	38.00	53.72	92.62	88.92
June	35.20	38.00	53.72	95.21	88.92
July	35.20	38.00	53.72	105.59	88.92
Aug.	35.20	38.00	53.72	105.59	88.92
Sept.	35.20	38.00	55.21	105.59	88.92
Oct.	35.20	38.00	55.58	105.59	88.92
Nov.	34.23	39.90	56.57	91.70	88.92
Dec.	34.20	39.90	61.01	88.92	88.92
Aver.	*35.22*	*37.47*	*52.25*	*81.73*	*88.92*

Structural Shapes at Pittsburgh

	1914	1915	1916	1917	1918
Jan.	1.20	1.10	1.90	3.25	3.00
Feb.	1.20	1.10	2.06	3.25	3.00
March	1.19	1.10	2.40	3.54	3.00
April	1.15	1.20	2.55	3.88	3.00
May	1.14	1.20	2.60	4.00	3.00
June	1.11	1.20	2.53	4.31	3.00
July	1.12	1.25	2.50	4.50	3.00
Aug.	1.19	1.30	2.52	4.30	3.00
Sept.	1.20	1.35	2.64	4.00	3.00
Oct.	1.15	1.44	2.75	3.00	3.00
Nov.	1.10	1.60	2.86	3.00	3.00
Dec.	1.07	1.78	3.25	3.00	2.90
Aver.	*1.15*	*1.31*	*2.55*	*3.67*	*2.99*

Ferromanganese at Seaboard

	1914	1915	1916	1917	1918
Jan.	$44.40	$68.00	$150.00	$175.00	$250.00
Feb.	39.25	69.75	207.50	231.25	250.00
March	38.50	100.00	349.60	290.00	250.00
April	38.00	100.00	406.25	362.50	290.00
May	38.00	100.00	387.50	429.50	290.00
June	38.00	100.00	270.00	443.75	290.00
July	37.20	109.00	175.00	406.25	290.00
Aug.	108.33	127.25	172.00	400.00	290.00
Sept.	90.00	117.00	169.75	387.50	285.00
Oct.	70.40	105.00	162.25	310.00	285.00
Nov.	68.00	105.00	160.80	256.00	285.00
Dec.	72.20	106.00	169.75	243.75	275.00
Aver.	*56.86*	*105.83*	*231.70*	*327.21*	*277.50*

No. 1 Steel Scrap at Pittsburgh

	1914	1915	1916	1917	1918
Jan.	$10.90	$11.63	$17.50	$22.60	$30.00
Feb.	12.62	11.63	17.06	21.75	30.00
March	12.12	12.00	18.45	23.25	30.00
April	12.00	11.81	17.81	28.00	28.50
May	12.00	11.75	16.95	28.80	28.50
June	12.00	11.75	15.88	41.00	28.62
July	12 00	12.31	16.31	39.00	29.00
Aug.	11.50	13.81	16.05	32.83	29.00
Sept.	11.31	14.30	16.19	33.25	29.00
Oct.	10.85	14.38	18.25	28.80	29.00
Nov.	10.00	15.88	21.20	29.50	28.87
Dec.	10.75	17.45	26.00	30.00	26.87
Aver.	*11.50*	*13.23*	*18.14*	*29.90*	*28.95*

No. 1 Steel Scrap at Chicago

	1914	1915	1916	1917	1918
Jan.	$9.35	$9.19	$15.50	$21.12	$30.00
Feb.	10.50	9.56	14.75	21.50	30.25
March	9.81	9.63	16.50	23.70	29.87
April	9.80	9.15	16.50	27.00	28.75
May	9.69	9.37	15.94	28.70	28.80
June	9.75	9.44	14.80	36.50	29.00
July	9.75	10.40	14.50	33.00	29.00
Aug.	9.69	11.56	15.25	29.60	29.00
Sept.	9.19	11.75	16.06	31.25	29.00
Oct.	8.50	11.75	16.81	26.00	29.00
Nov.	8.06	13.44	20.60	27.60	28.50
Dec.	8.43	15.63	23.00	28.37	22.75
Aver.	*9.38*	*10.91*	*16.68*	*27.86*	*28.66*

THIS WEEK ON THE ASSEMBLY LINE

o o o

By W. F. SHERMAN
Detroit Editor

o o o

. . . Spreading labor disputes threaten to disrupt back-to-work movement . . . Auto assemblies reach high peak for this date with output at 62,755 . . . Boost in exports to Canada expected by automobile companies.

DETROIT — Labor disputes on a wide front in Michigan threaten today to become an important counter-indicator in the back-to-work movement so recently launched. Strikes of important proportions already have affected a large number of plants in varied industries. Most important to other manufacturers in recent weeks have been the tie-up of 10 plants in the bearing industry strike, but other strikes in auto parts plants, the heating and ventilating manufacturing field and miscellaneous industries add to a growing total. A tie-up of utility power in the entire Saginaw Valley has became effective in the last week and a further serious strike in Briggs Mfg. Co. plants seems imminent.

Despite the tie-up of bearing manufacturing plants in the Detroit area, only one automobile manufacturer has taken steps to produce its own bearings. This is Packard, as reported last week. It is understood that two other manufacturers, Ford and Chrysler, considered the same step but decided against it because other bearing manufacturers located outside the Detroit area are able to supply all requirements and are now taking care of extra releases. Involved in this UAW-CIO strike are the plants of Bohn Aluminum & Brass Corp., the Federal-Mogul Corp., and the Detroit Aluminum & Brass Corp. Negotiators are deadlocked over the union shop issue and Federal attempts at conciliation have failed.

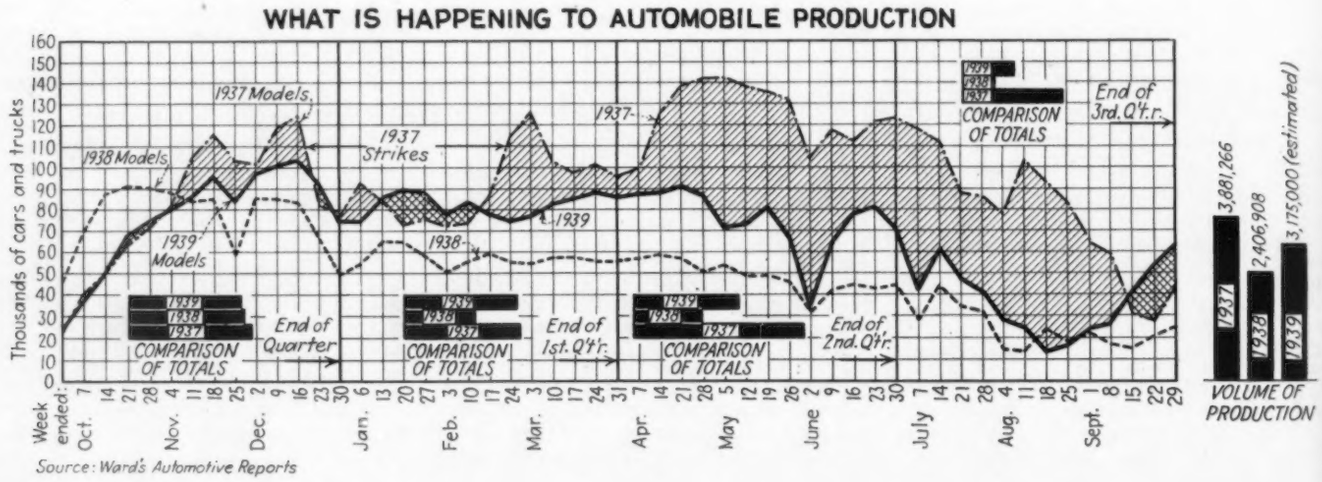
The closed shop issue caused the closing of the plant of Long Mfg. division of Borg-Warner Corp. at mid-week. Again the closed shop issue raised its head in a strike which has kept closed two plants of American Blower Corp. Union leaders in each case dodge stating the closed-shop issue, but plant officials declare that this is the primary consideration.

Power Strike Called

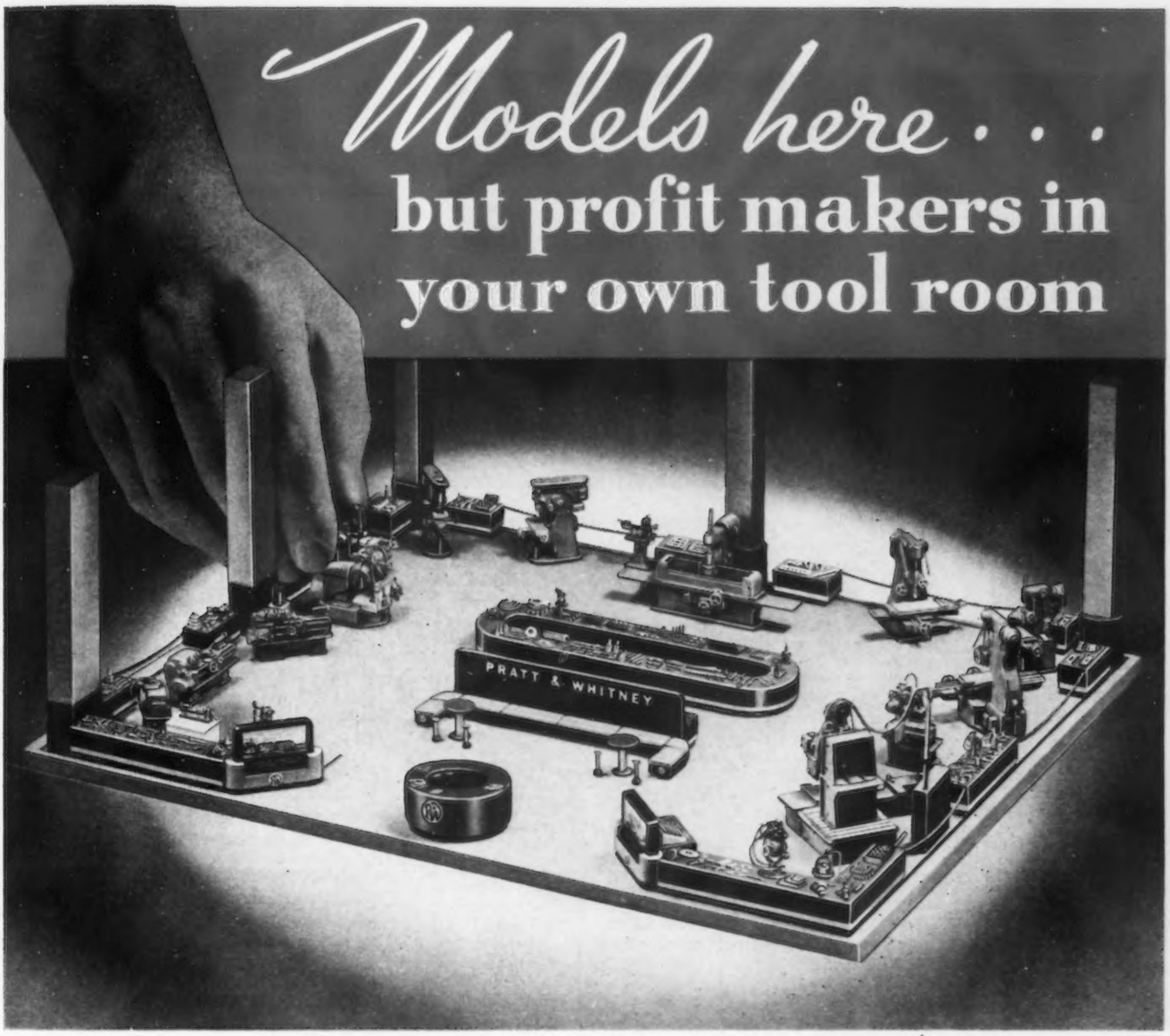
Recurrence of a persistent argument over bargaining between the Utility Workers Organizing Committee (CIO) and the Consumers Power Co. has caused a strike which affects the entire locality from Pontiac, Mich., north to Saginaw Bay, including a large and important industrial area. First interruption of service to an industrial user came last Friday when Fisher Body plant No. 1 at Flint was cut off from its source of power, causing 4400 employees to be sent home. Violence so far has included the tearing down of one important power line "blacking out" a group of small towns in the area. Nearly 1000 communities and more than 2,000,000 persons would be affected by a complete "blackout." A major part of General Motors production is in the area. Issues involved are confused, but include an argument over equalization of wages for men doing comparable work and an inter-union dispute between the CIO and the International Brotherhood of Electrical Workers (AFL). Litigation is holding up an NLRB election to decide the sole bargaining agent.

Hardly back at work after the tool and die strike that closed all Briggs

WHAT IS HAPPENING TO AUTOMOBILE PRODUCTION



Source: Ward's Automotive Reports



HERE'S a scale model of the kind of precision equipment you'd like to have in your own plant. These are the *newest developments* in Lathes, Vertical Shapers, Jig Borers, Thread Millers, Surface Grinders, Die Sinkers, Gear Grinders, Keller Automatic Tool Room Machines, Flexible Shaft Machines, Small Tools and Gages. There is no better time than *now* for modernizing your tool room. Pratt & Whitney precision machines and tools have a way of smoothing out your shop troubles, and producing dividends. Remember—there is no better paying investment than Pratt & Whitney Precision Tool Room Equipment. Ask for complete information.

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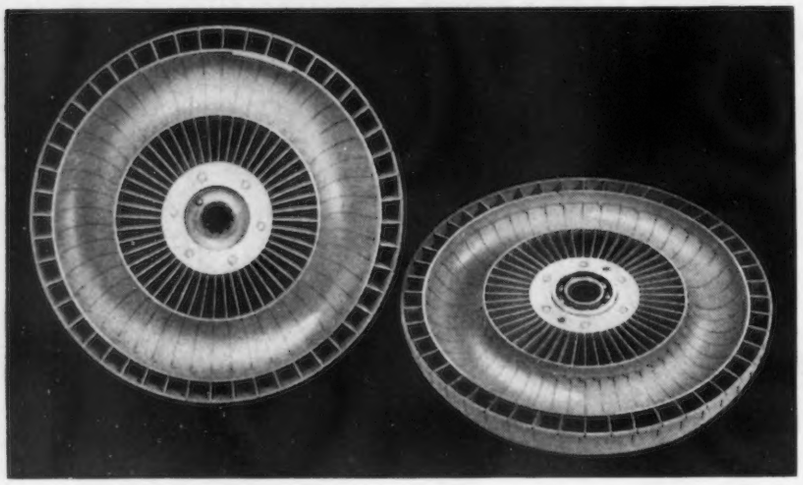


OLDMOBILE'S liquid flywheel is based on a principle which has been successfully used in various machines for more than 50 years. Combined with Oldsmobile's exclusive fully automatic transmission, the revolutionary "Hydra-Matic Drive" results.

The liquid flywheel consists of two members or rotors—the driving rotor which is fastened to the crankshaft and which revolves with the engine, and the driven rotor, fastened to the transmission shaft. Small vanes are located at regular intervals around the inside surface of the rotors. Both rotors are enclosed in a housing into which oil is pumped from the transmission under 30 lb. pressure to insure an adequate supply of oil for smooth transmission of power at all speeds. Power is transmitted from the engine to the transmission as a result of oil being thrown by centrifugal force from the vanes on the driver rotor against the vanes of the driven rotor.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

ARMY REGULATIONS? GOOD NIGHT! WHUT ARE YOU READIN' A THING LIKE THAT FER?
JUST IN CASE, MY BOY, JUST IN CASE... SO I WON'T BE NO BUCK PRIVATE IN CASE.... YOU NEVER HEARD OF A MAJOR ER COLONEL COMIN' BACK AN' RUNNIN' A DRILL PRESS, DID YOU? WELL, THEY'LL NEED TRAINED MEN AN' I'LL BE READY.'
THEY'VE NEEDED TRAINED MEN HERE, BUT I'VE NEVER SEEN HIM LOOK AT ANY-THING BUT A CALENDAR SINCE HE'S BEEN HERE
HE'S RIGHT, THO--HE'S GOT A BETTER CHANCE OF BEIN' BIG HERE IF HE GITS BIG IN A WAR, ER GOLF, ER-- YOU HAVE TO MAKE 'EM NOTICE YOU IN SOMETHIN' ELSE
T. M. REG. U. S. PAT. OFF. COPR. 1939 BY NEA SERVICE, INC.
THE INDIRECT ROUTE
J.R.WILLIAMS 9-29

plants in the late spring, UAW members are engaged in a bitter intra-union fight over seniority which threatens to close the plants this week, and tie up a large part of Chrysler's production of 1940 models.

Underneath all the subterfuge and ballyhoo that accompanies these strikes is a story of selfishness on the part of union leaders that is hardly paralleled. Months ago the question of inter-plant seniority came up—at just about the time it became apparent that the Briggs Highland Park plant might be closed down as a result of loss of business. It was known to union leaders as well as to others that the Ford pressed metal shop would probably take over production of the Mercury bodies, then being made in the Highland Park Briggs plant.

Emil Mazey, president of Local 212 (Briggs UAW-CIO), had never found the veteran Highland Park workers as loyal supporters as the younger, newer employees in the newer Briggs plants. In fact, there has always been "feeling" between the two groups. As a result UAW leaders, including shop stewards in all the plants, strongly urged a vote against inter-plant seniority. When the Mercury production ceased, Highland Park workers could not obtain transfers, and were out of jobs.

Witnesses inside the plants declare that the triumphant CIO group, conceited by its apparent winning of the Briggs strike last spring, proceeded to slow down production. A few weeks ago, when the company saw its veteran workers deprived of seniority and out of jobs, with production falling off in Mack Avenue plant where most of it had been concentrated, some of the work was transferred back to Highland Park. Mazey denounced this as a "discriminatory policy *** in moving work from one plant to another as a means to intimidate and coerce our membership into increasing production beyond a fair day's work."

Strike Action Withheld

On Sunday, Briggs workers voted to withhold strike action in order not to impair the bargaining power of 55,000 employees of Chrysler Corp., according to Mazey, who said 3000 members attended a meeting called to take a strike vote.

Reason for the delay is that the Chrysler UAW contract was permitted to expire at midnight on Saturday and CIO officers have declared intention of demanding immediate negotiations on a new agreement. In a National

Labor Relations Board election last week, the CIO won 11 out of 13 plants in the Chrysler chain including all nine Michigan units. Since Briggs makes bodies for Chrysler, a Briggs strike would tie up Chrysler production and thereby weaken the bargaining power of CIO workers at Chrysler.

Mazey declared Sunday that the Briggs argument was not over seniority within the union but was against the alleged practice of speeding up production in the Mack Avenue plant.

Auto Output Climbing

Automobile production last week reached a level higher than for any corresponding September week since 1929, and more than double the corresponding week of a year ago, according to Ward's Automotive Reports. Output reached 62,755 passenger cars and trucks in the United States and Canada, compared with 53,950 in the previous week and 25,405 in the corresponding week last year. Ford, rehiring thousands of men, stepped assemblies up from 1850 to 9100 on V-8's and Mercurys. Lincoln-Zephyr production, in its second week on 1940 models, increased to 140 from 100 in the first week. Chevrolet volume was up from 4000 to 4400; Plymouth from 12,300 to 12,400. General Motors volume was up from 16,176 to 17,550 and Chrysler from 21,100 to 21,975. Ward's estimates October production around 400,000 cars and trucks, but adds a warning note about strike outbreaks.

Inferences are heard locally that the Canadian Government may turn Dominion automotive plants into airplane parts factories and lift the tariff on importation of foreign made cars and trucks for duration of the war. The United States companies are likely to obtain the bulk if not all of the volume of cars ordinarily produced and sold in Canada. Ordinarily this might be a volume approaching 200,000 units in good times.

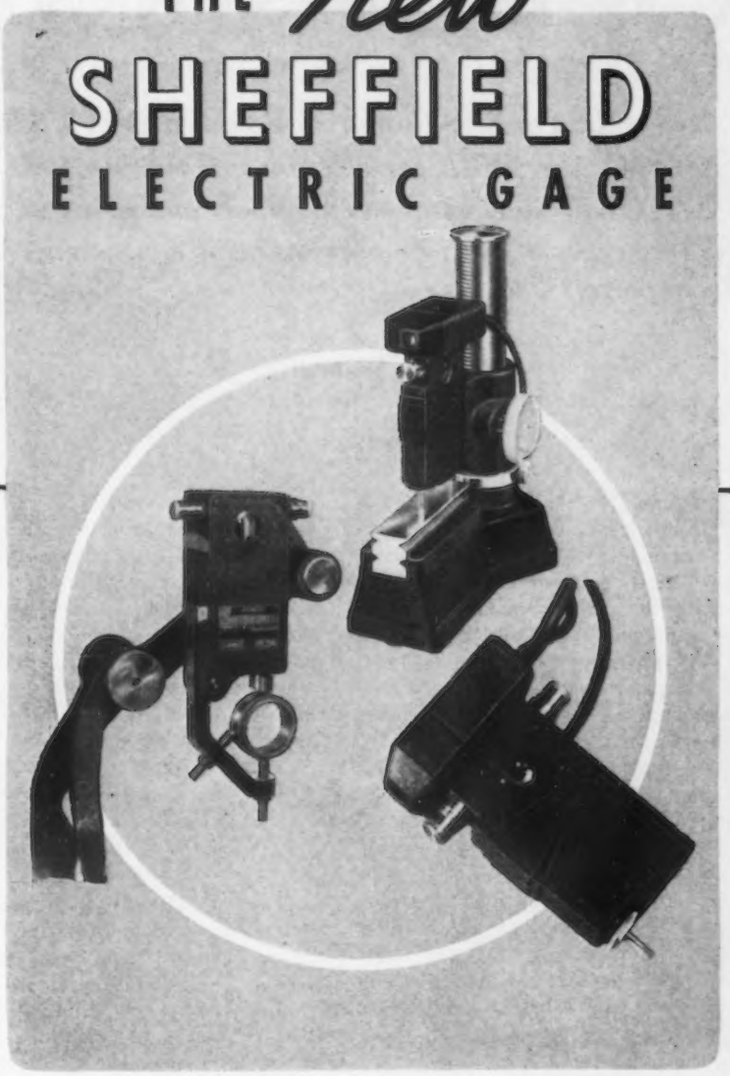
Sales of new passenger cars have continued an upward climb during September and R. L. Polk & Co. reports a probable national increase of 37 per cent compared with September a year ago.

Price tags and invoices, and firm prices without trick "packs" will be the vogue this year in automobile merchandising. General Motors has launched a drastic program and Chrysler has announced a firm policy on the subject of retail prices, both in an attempt to correct some of the evils which have grown up since used car trades forced the selling side of the industry to engage extensively in "horse trading."

THE *New*

SHEFFIELD

ELECTRIC GAGE



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THIS WEEK IN WASHINGTON

. . . Disbanding of War Resources Board puzzles Washington . . . SWOC asks NLRB for election in Crucible Steel plants . . . TNEC calls steel witnesses to appear at hearing beginning Oct. 16 . . . Steel Institute opposes tariff concessions on Belgian imports.

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By L. W. MOFFETT
The Iron Age

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WASHINGTON — Despite a steady six-year diet of emergencies, Washington reaction to the latest, the "war emergency," is becoming increasingly acute. Like all other emergency periods, it has its share of confusion and surprises. Last week's biggest surprise was the White House announcement that the War Resources Board would disband shortly. Designation of the Temporary National Economic Committee to become the Government's price watchdog during the emergency; a warning from the WPA that war orders will fall far short of taking up the unemployment slack and that PWA rolls will continue; and complications on Capitol Hill over the neutrality fight were among the other developments.

What was behind the move to disband the War Resources Board remained a subject for speculation. When it was established early in August, largely as a result of War and Navy Department publicity, it took on the appearance of a permanent advisory body whose job was just beginning and there were many, including members of the board themselves, who believed that the set-up was a permanent one, at least for the duration of the emergency. Announcement was made that additional members would be appointed later and word went out that in the event of war the board would become an executive agency with broad powers similar to those vested in the old War Industries Board. The plan, as revealed by War and Navy Department heads, was to have the board report directly to the President as a War Resources Administration in the event of a war in which the United States was involved.

Whether another board will be established later or the present one revived is not clear but the President's announcement was that the agency, composed of four industry representatives out of a total membership of six men who presumably would have considerable influence with the White House on subjects involving industrial mobilization, would disband shortly after it completes its study on mobilization plans. Observers who viewed the appointment originally as marking the end of the "brain trust" were quick to interpret the latest development as indicative that inner circle Administrationists of the Corcoran-Cohen school were back in the saddle.

Others preferred to classify the move as an attempt by the President to "play down" the war emergency while Administration lieutenants in Congress are engaged in the delicate but controversial job of reshaping neutrality legislation to meet White House specifications. Still others regarded the dismissal as a Presidential effort to crack down on Assistant Secretary of War Johnson, the Administration's energetic salesman of national defense needs, who was active in organizing the War Resources Board. Mr. Johnson reportedly has been straying away from the White House reservation of late in his reputed aspiration for becoming the next Secretary of War.

Board's Report Not Public

Mr. Roosevelt not only said the board would disband but minimized its forthcoming report, insisting that it would not make much of a story. The report, which will not be made public, covers the subject of industrial expansion under war conditions, administrative problems involved, the relation of transportation to industrial expansion, location of industries, and the related problems of expanded power facilities, rising agricultural prices and production.

The President's designation of the TNEC as the Government's price watchdog was made in a letter to Senator Joseph O'Mahoney, TNEC chairman. Mr. Roosevelt suggested that the committee watch prices of basic materials and "in the light of past and present circumstances study the facts to determine whether there is profiteering or whether such increases are legitimate." Constant surveillance by the joint legislative-executive agency, the letter said, would enable it to become "an important part of our first line of national defense against ugly and inhuman greed."

The Senator declined to discuss what his committee would do but he told newsmen, who were summoned to a special press conference, that he would call a meeting to "determine proper procedure and to thoroughly canvass the problems."

WPA Rolls Will Continue

The possibility of reducing unemployment to a minimum through a war-stimulated production was discounted by Col. F. C. Harrington, Works Progress Commissioner, who recalled that dislocations in the economic structure in the early years of the World War cannot be entirely ignored. Even if exports to England and France increase by a billion dollars over the next year and if South American trade doubles he said, unemployed will be cut down considerable "but not enough by itself to create a boom in business."

"Provide real jobs for WPA workers and you can have them and welcome," he added, directing his remarks particularly to business and industry. "But do not ask us to dismiss any more WPA workers because of predicted jobs to come from the European war." Since the beginning of the calendar year, WPA rolls have been reduced by a total of 1,300,000 workers but to date relatively few have been succeessful in getting private jobs, he said. "There has been some improvement in business, but certainly no boom. In fact private employment is not very much higher than it was on Jan. 1."

Complications developing over the neutrality issue concerned the disclosure that the proposed new 90-day credits to foreign countries would modify the Johnson Act, which forbids

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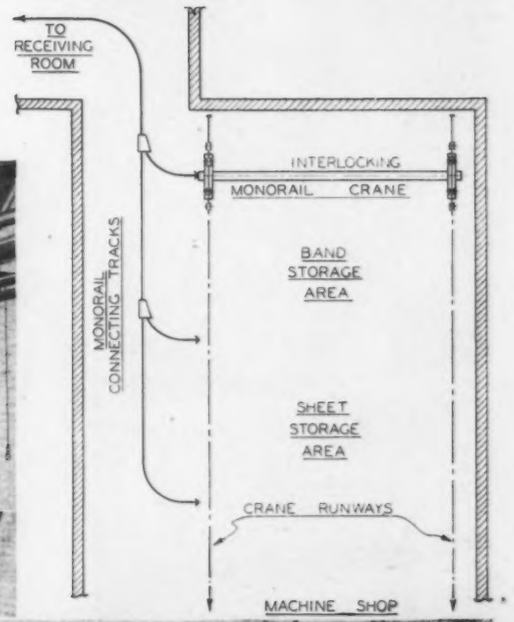

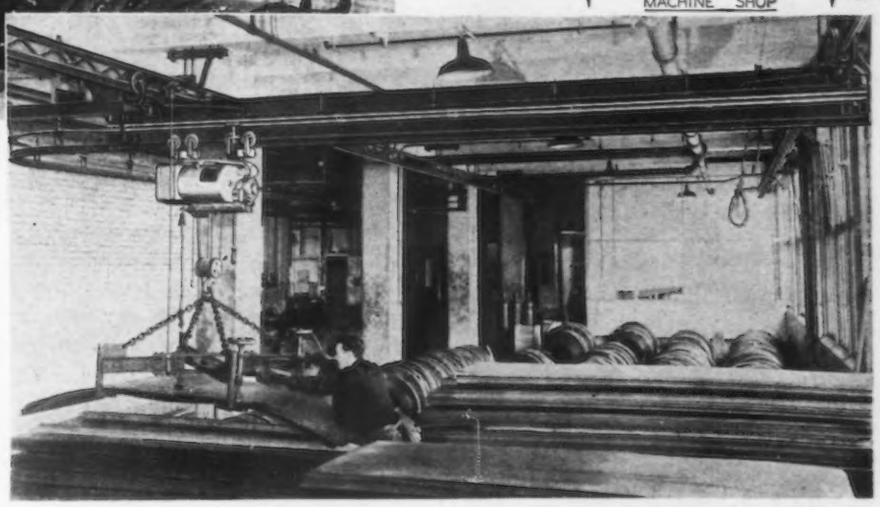

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loans to nations in default on World War debts. This controversy prompted Senator Johnson, Democrat of California and author of the law bearing his name, to disclose plans for amending the bill on the floor of the Senate. Guns of the isolationists were opened on the President's plan to repeal the arms embargo early this week after the Senate Foreign Relations Committee, by a 16 to 7 vote, approved and sent the so-called Pittman resolution to the Senate.

Some members of the Foreign Relations Committee who had voted for the bill complained that sections of the measures originally receiving their approval had turned out differently than they expected. The days ahead promised a bitter battle.

Tariff Revisions on Belgian Steel Opposed by Institute

WASHINGTON—The American Iron and Steel Institute recommended to the State Department's Committee for Reciprocity Information last week that further efforts to negotiate a reciprocal trade agreement with Belgium be indefinitely postponed because of developments in Europe but asked that, if negotiations are continued, no further concessions be granted on imports of iron and steel products.

Basing his argument on peace-time conditions and turning aside the possible effect of existing and future abnormal conditions in world trade, Walter S. Tower, executive secretary of the institute, pointed out in a brief filed with the committee that Belgium is the outstanding source of imports of semi-finished and finished steel products and was responsible for 46 per cent of such imports by tonnage during 1938 and for 40 per cent during the first six months of this year; that there is no real economic necessity or reason for imports of iron and steel products into this country because the productive capacity of the industry has long been ample to supply the demand; and that any tariff concessions granted under the proposed revision would serve to give foreign producers a further advantage in competing with domestic producers, from whom American workmen receive average hourly earnings of 83c.—a figure approximately three and one-half times the average hourly rate paid in the Belgium iron and steel industry.

1938 Taxes Exceeded Earnings

Mr. Tower recalled that during the 10-year period 1919 to 1928 the average return on the industry's invested capital was 5.1 per cent but that this fell off to 2.4 per cent from 1929 to 1938 and for the first half of the current year had dwindled to 1.06 per cent; that in 1938 taxes exceeded available net earnings by nearly 18 per cent, causing a net loss of almost $15,000,000 before dividends.

To the argument that imports of iron and steel products commonly constitute only a small fraction of total domestic consumption and that the sale or use of such imports is largely confined to seaboard areas, Mr. Tower said that the ultimate competitive effect may be widespread because distributers or users located along the seaboard are in direct competition with inland distributers or users. That situation, he said, may again be repeated through other links in the competitive chain, thus, by a process of infiltration, extending the effect of competition of iron and steel imports far inland. Mr. Tower added that practically all domestic iron and steel producers, both seaboard and inland, depend at least in part on seaboard markets, which, he said, are directly exposed to active competition from imports of foreign iron and steel products.

The iron and steel products on which the State Department has announced it would consider tariff concessions, including those already covered by the original agreement with Belgium, some of which have appeared in other reciprocal trade agreements and some additional items which have not previously appeared in any agreement, follow:

Sheet iron or steel, common or black; boiler or other plate iron or steel; steel ingots valued at not more than 1½c.; muck bars; sheets; beams, girders, joists, angles, channels, etc., not assembled; hoops or band iron; wire rods; wire strand; woven wire fencing; rivets; bolts; nails; spikes, etc.; rail braces, railway fishplates; all galvanized wire not specifically provided for.

Sept. 27 was the closing date for receiving briefs. Public hearings on the proposal to revise the agreement will start Oct. 9.

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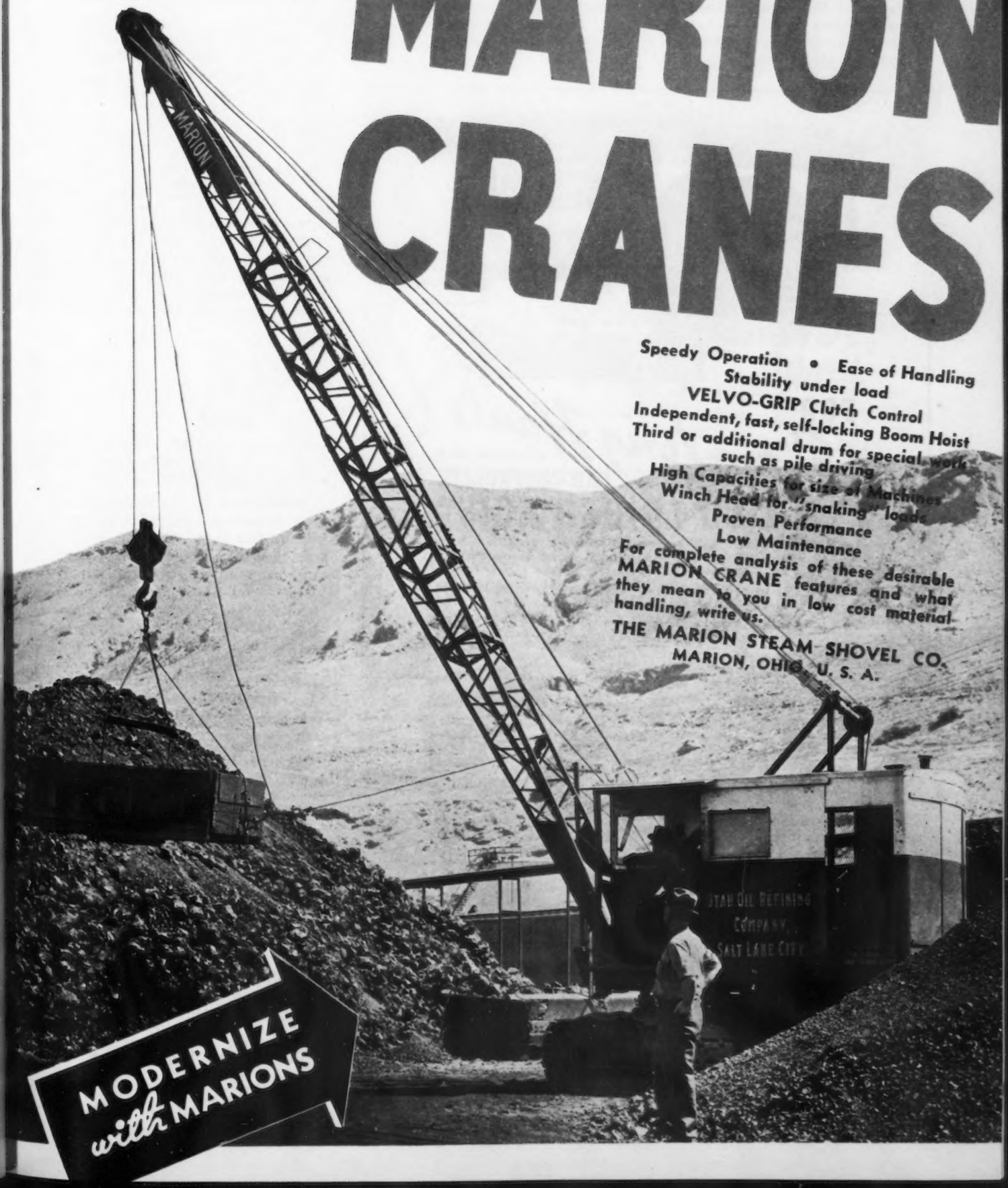

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Ships to be Ordered by Jan. 1 to Require 50,000 Tons of Steel

WASHINGTON — Maritime Commission records showed this week which marks the passage of two years since the commission awarded its first contract, that contracts for 132 ships, requiring a total of 484,080 tons of steel, have been awarded since the commission inaugurated its shipbuilding program in 1937. The ships cost $323,977,006, of which approximately $176,225,288 represents the cost of machinery. One tanker and one C-2 cargo ship have been completed and delivered. Ship already launched include the luxury liner, America, and seven C-2 steel cargo vessels.

At no time in the past two years has the agency placed orders for ships at a greater pace than it has during the past four weeks. Largely as a result of the outbreak of war in Europe, the commission awarded contracts for 49 ships during that period as it stepped up its 50-ships-a-year goal to 100 ships this year. These 49 ships will require a total of 162,000 tons of steel and will cost $104,571,000. Of this amount $49,377,030 will cover the cost of machinery.

Information furnished THE IRON AGE indicates that additional orders for the following ships, to require about 50,000 tons of steel, will be placed before January 1:

No. Ships	Type	Steel Tonnage Each	Steel Tonnage Total
8	C-2 steel cargo ships...	3600	28,800
9	C-1 steel cargo ships...	2650	23,850
1	C-3 steel cargo ships...	4370	4,370

In addition, contracts for five C-1 cargo ships may be awarded but this order will supersede a contract awarded the Tampa (Fla.) Shipbuilding & Engineering Co., on Aug. 9, and hence, if awarded, will not increase the total number of ships under contract. The company asked that the former contract be rescinded when the commission placed an order for four C-2 ships on Sept. 23, and this request was complied with.

Shipyards receiving awards since Sept. 1, the ships ordered, and the amounts involved follow:

Bethlehem Steel Co., Staten Island yard, five steam-propelled C-1 cargo ships to cost $1,909,000 each; Bethlehem Steel Co., Quincy, Mass., four cargo ships for the American Export Lines to cost $2,430,000 each; Bethlehem Steel Co., Sparrows Point, three cargo vessels for the Seas Shipping Co., to cost $2,140,000 each; five steam-propelled C-1 cargo ships to cost $1,889,000 each; Union Iron Works, San Francisco, five steam-propelled C-1 cargo ships to cost $2,002,000 each.

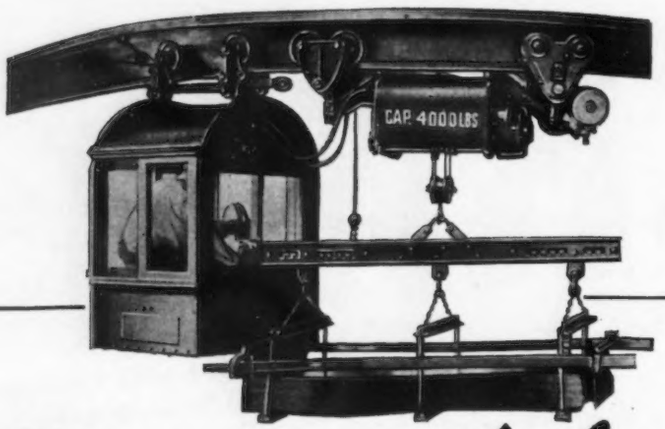
Western Pipe & Steel Co., San Francisco, five C-1 diesel-propelled cargo ships to cost $2,127,000 each

Seattle-Tacoma Shipbuilding Corp., Seattle, five diesel-propelled C-1 cargo ships to cost $2,127,000 each.

Sun Shipbuilding & Dry Dock Co., Chester, Pa., six direct drive diesel ships of the C-2 design to cost $2,277,000 each; and two additional ships, same design, to cost $2,257,000 each.

Ingalls Shipbuilding Corp., Birmingham, Ala., and Pascagoula, Miss., four C-3 cargo ships to cost $2,550,000 each.

Tampa (Fla.) Shipbuilding & En-



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gineering Co., four turbine-driven ships of the C-2 design to cost $1,950,000 each.

Newport News (Va.) Shipbuilding & Dry Dock Co., one steam-propelled C-3 cargo vessel of the combination cargo-passenger type, to cost 3,630,000.

TNEC Calls Steel Witnesses for Oct. 16

WASHINGTON — Justice Department officials working on the Temporary National Economic Committee's investigation of the steel industry have mailed out invitations to about 30 representatives of the steel industry, asking them to appear at public hearings which start Oct. 16. Officials declined to disclose the names of steel witnesses expected to appear, explaining that the list is tentative, subject to last-minute changes, and may not accurately indicate the names of those who actually will testify before the committee.

In laying plans for the conduct of the public sessions, the industry has been divided into three divisions, comprising small, medium and large companies. At the hearings, expected to last two weeks but which may be prolonged beyond that period, the Department of Justice will cover such subjects as concentration of capacity, production, pricing methods, distribution, profits, employment, and problems relating to integration, investment and fabrication in transit.

The steel executives have been called to assist the department in developing subjects treated in exhaustive data collected from two questionnaires and from steel company files.

Glasgow Shipyards Now Building 22 Warships

WASHINGTON—The Commerce Department reports that sharply increased activity in the shipyards of Glasgow, Scotland, where the number of warships now under construction constitutes a record for any shipbuilding district in Great Britain, centers around one 40,000-ton battleship, one of the largest orders that has ever come to the Clyde, one merchant vessel of 9000 tons, and 20 vessels of the "minor warship" class, comprising boom-defense vessels, trawlers, and patrol ships of the whale-catcher type.

Canada Licensing Exports of Metals

WASHINGTON—To safeguard domestic and military requirements, Canada has subjected a number of commodities to export license requirements. According to information received by the Commerce Department, the products affected include, among others: bauxite, alumina, and aluminum; cadmium; cobalt, in ore, refined, salts and stellite; copper in ore, concentrates, and refined; ferromanganese, ferrosilicon; lead in ore, concentrates, and refined; nickel, in ore, matte, and refined; nickel oxide, zinc in ore, concentrates, and refined; and scrap metals of all kinds.

The avowed purpose of the action is to control exportation of products capable of being converted into the production of arms, ammunition, implements, or munitions of war, and to prevent them from reaching enemy destination.

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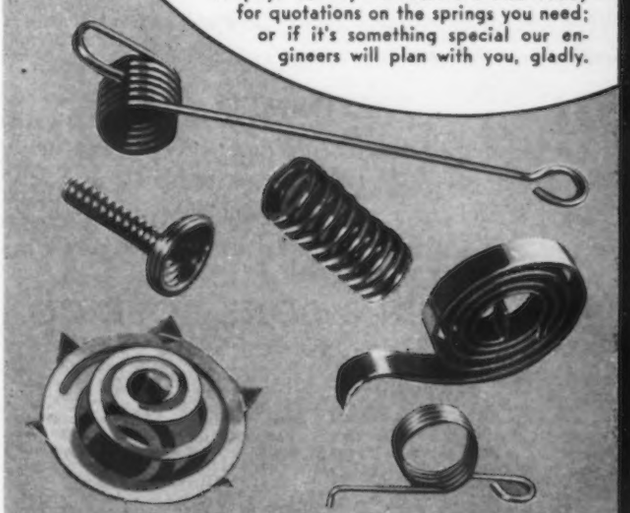

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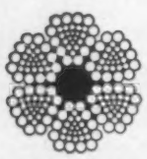
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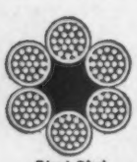
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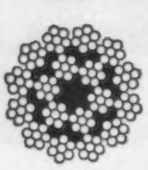
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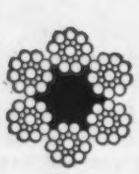
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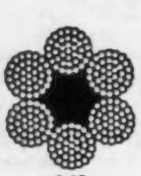
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Government Steel Orders

WASHINGTON — Government contracts for iron and steel products, as reported for the week ended Sept. 23 by the Public Contracts Division of the Labor Department, totaled $2,036,057. Contracts for non-ferrous metals and alloys amounted to $411,132 and for machinery, $503,429. Details, including government departments making the awards, follow:

Iron and Steel Products

Laclede Steel Co., St. Louis, Mo., WPA, welded steel fabric	$15,330.22
Advance Foundry Co., Dayton, Ohio, TVA, lining castings	12,812.00
Bethlehem Steel Co., Bethlehem, Pa., Navy S & A, steel forgings	34,110.00
Westinghouse Electric & Mfg. Co., Essington, Pa., Navy S & A, forged base rings and racks	36,975.00
Florence Pipe Foundry & Machine Co., Philadelphia, and Florence, N. J., Panama Canal, cast-iron water pipe	18,447.00
Youngstown Sheet & Tube Co., Youngstown, Panama Canal, steel reinforcement bars	23,640.62
Colorado Fuel & Iron Corp., Denver, Interior, railroad material, track rail	185,118.36
Bethlehem Steel Co., San Francisco; Bethlehem, Pa.; Seattle; Johnstown, Pa.; Sparrows Point, Md., Navy S & A, steel, bar	11,733.83
Pacific States Steel Corp., San Francisco, Interior, reinforcing steel bars	100,534.00
Carnegie-Illinois Steel Corp., Pittsburgh, Navy S & A, steel, bar	30,227.83
Jones & Laughhlin Steel Corp., Pittsburgh; Aliquippa, Pa., Navy S & A, steel I-beams	14,234.00
Jones & Laughlin Steel Corp., Pittsburgh; Aliquippa, Pa., Navy S & A, steel I-beams	Indefinite
Carnegie-Illinois Steel Corp., Pittsburgh, Navy S & A, steel I-beams	226,975.00
Carnegie-Illinois Steel Corp., Pittsburgh, Navy S & A, steel	Indefinite
Thos. Gregory Galvanizing Works, Maspeth, N. Y., Navy S & A, steel, I-beams	Indefinite
Ross Galvanizing Works, Inc., Brooklyn, N. Y., Navy S & A, angles, channels, I-beams	10,712.50
Hart Mfg. Co., Inc., Louisville, War Q M C, ranges	13,209.00
Inland Steel Co., Chicago, TVA, steel sheet piling	1,035,806.60
International-Stacey Corp., Columbus, Ohio, TVA, structural steel.	11,670.00
Bethlehem Steel Co., Bethlehem, TVA, steel towers	34,444.00
Pennsylvania Forge Corp., Philadelphia, Navy S & A, propeller shafts	27,790.00
Sherman & Reilly, Inc., Chattanooga, Tenn., TVA, suspension bridge	66,077.00
Carnegie-Illinois Steel Corp., Chicago, War Engineer, steel sheet piling	15,971.70
Noland Co., Inc., Washington, D. C., Procurement, miscellaneous tools	Indefinite
South East Joslyn Co., Cincinnati, TVA, steel strand	35,987.99
South East Joslyn Co., Cincinnati, TVA, steel strand	22,744.03
American Steel & Wire Co. of N. J., St. Louis, War Engineer, wire strand	14,062.62
Carnegie-Illinois Steel Corp., Chicago, War Ordnance, carbon steel	13,641.86
Pettibone Mulliken Corp., Chicago, Interior, track material	12,827.00
The P. & M. Co., Chicago, Interior, rail anti-creepers	10,975.75

Non-Ferrous Metals and Alloys

Aluminum Co. of America, Pittsburgh, TVA, electrical conductor.	$30,006.54
Revere Copper & Brass, Inc., Baltimore, War Ordnance, brass strip.	30,700.00
Bueller Brass Co., Port Huron, Mich., Navy S & A, brass forgings	46,298.75
The Riverside Metal Co., Riverside, N. J., Treasury, bronze blanks.	82,240.00
The Riverside Metal Co., Riverside, N. J., Treasury, bronze blanks.	82,240.00

Scovill Mfg. Co., Philadelphia, Treasury, 5c. blanks	52,000.00
American Expansion Bolt & Mfg. Co., Chicago, Procurement, addressing-machine plates	Indefinite
American Brass Co., Waterbury, Conn., Navy S & A, tubing, copper-nickel-alloy	46,038.78
American Car & Foundry Co., New York City, Berwick, Pa., War Engineer, pontoon bridge equipment	30,672.05
Walter Kidde & Co., Inc., New York City, and Bloomfield, N. J., TVA, fire extinguishing equipment	10,936.65

Machinery

LeRoi Co., Milwaukee, War Engineer, air compressors	$12,387.00
R. L. Harris, Inc., Knoxville, Tenn., TVA, tractors	69,848.90
Brooks Equipment & Mfg. Co., Knoxville, Tenn., TVA, tractors.	12,820.00
Yates American Machine Co., Beloit, Wis., Marine Corps, planer and moulders	14,008.09
Lloyd & Arms, Inc., Philadelphia, War Ordnance, charging machines	12,500.00
W. E. Shipley Machinery Co., Philadelphia, War Ordnance, screw machines	43,628.40
Ferracute Machine Co., Bridgeton, N. J., War Ordnance, presses...	28,265.00
Goulds Pumps, Inc., Seneca Falls, N. Y., Navy S & A, oil purifiers.	25,183.80
Northern Pump Co., Minneapolis, Minn., Navy S & A, pumps	16,094.00
Worthington Pump & Machinery Corp., Harrison, N. J., Interior, pumping units	104,947.00
Hale Fire Pump Co., Conshohocken, Pa., War Q M C, pumps	19,298.10
R. L. Harris, Inc., Knoxville, Tenn., TVA, tractors with bulldozers ..	23,632.65
The Galion Iron Works & Mfg. Co., Galion, Ohio, War Engineer, road rollers	14,109.00
Lidgerwood Mfg. Co., Elizabeth, N. J., Navy S & A, winches	41,886.00
The Browning Crane & Shovel Co., Cleveland, Panama Canal, cranes, locomotive	46,212.00
Warner Elevator Mfg. Co., Cincinnati, TVA, electric elevator	18,610.00

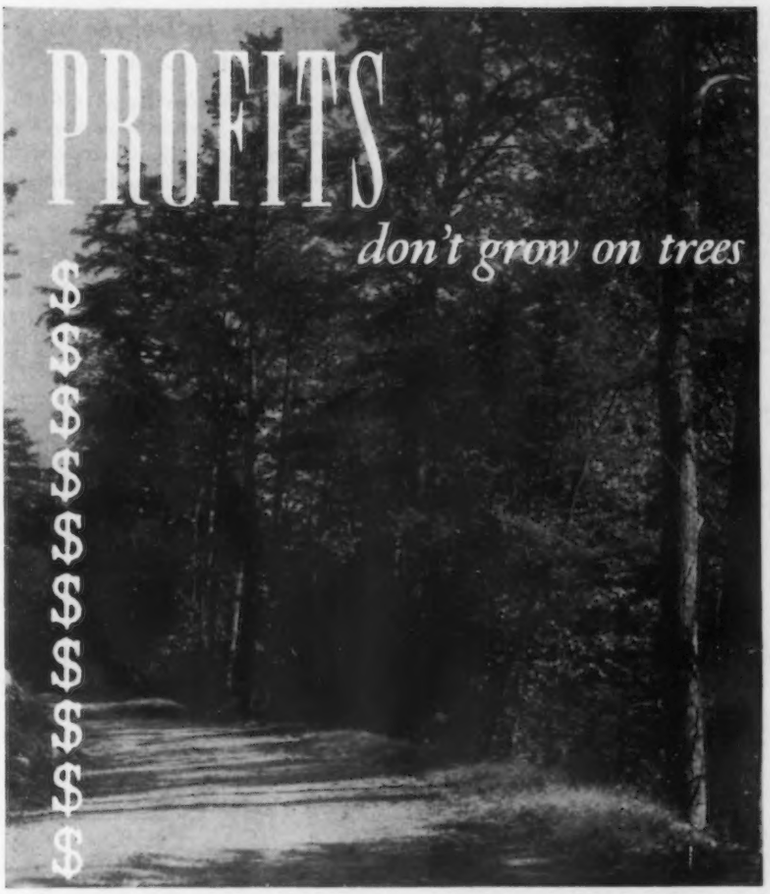
Navy Awards to U.S. Industries

WASHINGTON—The Navy Department's Bureau of Supplies and Accounts last week awarded contracts to these companies:

Metal & Ore Corp., New York, tungsten ore, $438,000; United Aircraft Corp., Pratt & Whitney Aircraft division, East Hartford, Conn., aircraft engines, and spare parts, $348,227; Central Iron & Steel Co., Harrisburg, Pa., $115,837; National Lead Co., Baltimore, pig lead, $87,575; The Cooper Bessemer Corp., Washington, marine diesel engines, and spares, $70,250; William Sellers & Co., Inc., Philadelphia, horizontal boring, drilling and milling machine, $41,053; William Sellers & Co., Inc., Philadelphia, horizontal boring, drilling and milling machine, $36,415.

Crane Co., Washington, high pressure steam valves, $38,445; Pratt & Whitney division, Niles-Bement-Pond Co., Hartford, precision equipment lathes, $33,225; Buffalo Pumps, Inc., Buffalo, N. Y., pumps, spare parts, tools and wrenches, $27,820; Henry Prentiss & Co., Inc., New York, horizontal boring, drilling and milling machine, $22,259; United Aircraft Corp., Pratt & Whitney Aircraft Division, East Hartford, Conn., aircraft engines, $20,563; Crane Co., Washington, steel valves, $17,984; and the Pennsylvania Smelting & Refining Co., Philadelphia, pig lead, $17,283.

Aldrick Pump Co., Allentown, Pa., pumps, spare parts, tools and wrenches, $12,446; Manning, Maxwell & Moore, Inc., Bridgeport, Conn., steel valves, $11,666; Bove & Emmes Machine Tool Co., Cincinnati, heavy duty engine lathe, $11,053; Greenville Steel Car Co., Greenville, Pa., railroad cars, $10,324; Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati, heavy duty milling machine, $10,114; Northern Pump Co., Minneapolis, diesel fuel oil pumps, $9,685; Chapman Valve Mfg. Co., Springfield, Mass., steel



YOU MUST PLAN THEM

CERTAINLY it is obvious to all those who read this that profits don't grow on trees. It is just as obvious that they must be planned. But there is one phase of planning profits which we often find overlooked. That is the use of modern cost reducing, product improving machine tools. Suppose we take as an example the ball bearing manufacturer who planned profits by installing modern Landis Race-A-Way Grinders. Production on his older machines was forty percent less than that secured on the new equipment. Therefore, the manufacturing cost of his races was lowered with a consequent improvement in profits. On top of this was the plus value of more accurate output and even the elimination of one operation under certain circumstances. Landis engineers have been helping grinding machine users to plan profits for over forty years.

309

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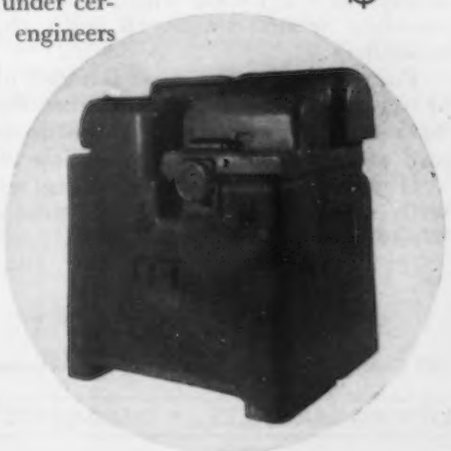

PRECISION LANDIS GRINDERS

LANDIS TOOL CO.
WAYNESBORO, PA.

valves, $8,676; Hudson Smelting & Refining Co., Newark, N. J., pig lead, $8,325; Pittsburgh Forging Co., Coraopolis, Pa., steel forgings, $7,064; Camden Forge Co., Camden, N. J., training gear pinions, $6,300; Crane Co., Washington, steel valves, $6,011; and the Westinghouse Electric & Mfg. Co., Pittsburgh, arc welding machine, $5,415.

Central Iron & Steel Co., Harrisburg, steel plates, sheets and strip, $153,465; Arter Grinding Machine Co., Worcester, Mass., rotary surface grinder, $9,368; Buffalo Forge Co., Buffalo, N. Y., ventilating sets, controllers, and spare parts, $32,673; Curtiss Wright Corp., Curtiss Propeller division, Clifton, N. J., spare aircraft parts, $12,690; Consolidated Machine Tool Corp., Rochester, N. Y., vertical boring and turning mill, $28,549; Bethlehem Steel Co., Bethlehem, Pa., nickel molybdenum bar steel, $13,242.

Reich Unable to Deliver Locomotives to Chile

WASHINGTON—Reports to the Commerce Department are that railroad equipment orders placed with German firms in 1937 by the Chilean State Railways have not been delivered. The orders, which called for 16 three-car articulated trains, three electric locomotives and other equipment valued at $3,273,397 in United States currency, were made primarily to increase tourist travel to the South, electrify and improve certain lines, and decrease coal consumption.

WITH orders coming in fast, it's certainly no time to take chances with delays, rejected work and lost profits.

New Dings High Intensity Magnetic Separators will help to speed up work, eliminate delays.

Used to remove all the iron from foundry sand they cut down imperfections and rejects, reclaim iron otherwise lost in the dump, save time and money in reconditioning sand.

Used to remove iron from non-ferrous cuttings and turnings, Dings will eliminate contamination of remelted metal, prevent tool breakage when working such metal or make it possible for you to get higher prices for scrap.

Today's Dings Separators are more powerful than ever before. Many old machines, while still doing a job of sorts, are definitely obsolete when compared with the performance of new Dings machines.

For example, the new Dings Pulley is the most powerful unit of its type on the market size for size—a fact made possible by *bronze* spacer rings which do not short-circuit lines of force, and an air-cooled design which insures cooler operation.

If you've been getting along without magnetic separators or with obsolete ones, now's the time to install new Dings machines. Write for information today.

DINGS MAGNETIC SEPARATOR COMPANY

727 Smith St. Milwaukee, Wisconsin

Dings High Intensity MAGNETIC SEPARATION

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Farm Equipment Exports Decline in August

WASHINGTON—Farm equipment exports in August were valued at $6,465,571, 3 per cent below the exports in August, 1938. The Machinery Division of the Department of Commerce reports that smaller shipments of wheel tractors and grain combines were primarily responsible for the decline but increased shipments were made in a majority of the types separately classified.

Tillage implement sales abroad increased 13 per cent and totaled $473,278 compared with $417,123 a year ago, harvesting machinery exports were down 5 per cent to a value of $1,051,101, and wheel tractor shipments decreased 29 per cent below August, 1938.

Belgium Licenses Ore And Metal Exports

WASHINGTON—According to information received by the Commerce Department, the Belgian Government has issued decrees requiring permits for the exportation and transit of iron ore and metal manufactures.

$6,317,000 For Army Planes

WASHINGTON—Without disclosing the number of craft the War Department has announced awards for the construction of military pursuit planes to cost $6,317,000. The awards were made to the Seversky Aircraft Corp., Farmingdale, L. I., and the Bell Aircraft Corp. of Buffalo. The Seversky contract amounted to $3,478,000 and the Bell contract to $2,839,000. Announcement also was made of awards amounting to $1,618,724 for engines, engine parts, altimeter and indicator assemblies.

Egypt Licenses Exports

WASHINGTON—Since Aug. 28, the Egyptian Government has made the exportation of various essentials, including manganese and automobiles subject to license by the Ministry of Finance, according to information received by the Department of Commerce.

Steel Standardization

(CONCLUDED FROM PAGE 33)

Grain size: This steel to have 6 to 8 grain size as checked by the McQuaid-Ehn (A.S.T.M. E19-33).

Grain structure: This steel to be furnished with a lamellar-pearlitic structure.

Heat treatment: This steel to be heat treated at a temperature above the upper critical and cooled at the proper rate to produce the desired grain structure and hardness.

Hardness: This steel must be within the Brinell hardness range of 187 to 217 with a desired hardness of 207.

Hardenability: A rectangular specimen 3 x 2 x 13/16 in. thick shall be furnished from each heat of steel. This specimen shall be thoroughly sand blasted to remove all scale. The surface "B" (Fig. 5) will be machined to remove 1/16 in. The specimen should harden to at least 49 R_c when placed in a furnace at 1500 deg. F. held for 45 min. and oil-quenched in a good commercial quenching oil. Rockwell readings to be taken as shown on surface "B" in Fig. 5. (Consumer to machine and harden sample.)

Specification No. 3H

Grade: SAE 4145 standard analysis is acceptable. However, a carbon content of 0.43 to 0.48 is desired.

Grain size: This steel to have 6 to 8 grain size as checked by the McQuaid-Ehn test.

Heat treatment: This material shall be forged, properly normalized and heat treated to the required Brinell hardness.

Hardness: This steel must be within the Brinell hardness range of 321 to 363.

Specification No. 3K

Grade: SAE 4145 standard analysis is acceptable. However, a carbon content of 0.43 to 0.48 is desired.

Grain size: This steel to have a 6 to 8 grain size as checked by the McQuaid-Ehn test. (ASTM E19-33).

Heat treatment: This material shall be forged, properly normalized, ROUGH MACHINED and heat treated to the required hardness.

Hardness: This steel must be within the Brinell hardness range of 321 to 363.

Straightness: For long shaft that must be straightened after heat treatment, a low temperature draw must be given after the straightening operation.

The above specifications are self-explanatory with the exception of the hardness limits set up on specifications 3E and 3K. There are many plants that machine SAE 4145 steel at higher hardness than the limits given. However, it is felt that the upper limit of 363 Brinell is the maximum hardness desirable for general machining operations. The steel can be machined at hardness as high as 429 Brinell but very slow cutting speeds are required.

Specification for the other standard steels should be set up in a similar manner.

The specifications for the standard steels for special applications must be

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to MEAD SCREW PRODUCTS COMPANY

D. C. Mead, pressed for time in filling an important customer's order, consulted Cities Service Lubrication Engineers. After a study of his problem, they recommended the correct Cities Service Cutting Lubricant—increasing his production speed 25%, lengthening cutting tool life and helping Mr. Mead turn out a better finish.

You, too, will find our Lubrication Engineering Service a help in turning out work that meets the demands of your most discriminating customers. This service offers you the culmination of a long and varied experience in the solving of many cutting oil problems—plus oils developed as a result of this experience. Let one of our Lubrication Engineers prove the value of these oils to you in your own operations. There is no obligation.

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City ..... *State* .....

given very careful consideration because it is purchased in rather limited quantities and short deliveries are usually essential. In view of these conditions, it is frequently impossible to set up as rigid requirements on those items—as can be applied to the standard grades.

If each of the various grades of tool steel can be purchased from one source of supply, the specifications can be applied very successfully. However, if they are purchased from several sources, (the writer does not deem this practice advisable for small consumers), it is difficult for small consumers to establish workable specifications.

Ed. Note: Next week the author will present the concluding section of this five-part article. Suggestions for a materials inspection program will be given, and a code system will be shown for indicating various steels and heat treatments on records and drawings.

Garlock
7021
Compressed Asbestos Sheet Packing
The outstanding player on any football team is the one who has *rugged strength* to back up his superior playing ability. GARLOCK 7021 Compressed Asbestos Sheet Packing has this same quality—*rugged strength* to withstand extreme pressures and high temperatures.
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ONE
ALWAYS
STANDS
OUT!
Thicknesses from 1/64" to ¼". Sheets 40" x 40" and larger.

Aluminum from Novelties to Structural Shapes

(CONCLUDED FROM PAGE 42)

paint, and for unusually severe conditions the Alclad combination is recommended. They have excellent workability and are suitable for a very wide range of applications calling for high strength, from rivets to airplane and airship construction.

Aluminum - magnesium - silicon - chromium is recommended for severe drawing and forming operations, permanence of appearance and excellent corrosion resistance, with moderate strength. It is very well suited to architectural work.

Aluminum - silicon - magnesium is particularly suited to severe drawing and forming operations, cold and hot, and forgings as well.

An alloy of importance is aluminum-copper-silicon-manganese, which has special merit as forgings. Among its primary applications are airplane propellers.

Finishes for Aluminum

A variety of special finishes have been developed for aluminum, almost all essentially decorative in character but in some cases also highly protective. The simplest finish is, of course, polishing and buffing to produce a high lustre. Other mechanical finishes include scratch-brushing and satin finishing to obtain a soft, smooth sheen with lowered reflectivity than the highly polished surface. Still other decorative effects can be produced mechanically by hammering, fluting and sand-blasting, to obtain a mat surface, and tumbling and burnishing for cheap bright surfaces.

Special finishes are produced chemically, such as the frosted finish (etching in hot caustic soda) and etched finishes (etching special designs through a "resist" with a 10 per cent hydrofluoric acid). A new chemical finish, called Alrok, provides a bluish or greenish color.

Two of the outstanding aluminum finishes in wide commercial use are Alumilite and Alzak. Both are electrolytic oxide finishes, formed by anodic treatment in various electrolytes. The Alumilite process is used to produce plain or colored surfaces in every variety. The Alzak process for aluminum reflectors provides a hard, clear, glass-like oxide coating with a very high lustre, which is highly resistant to weather and can be easily cleaned.

Machinery Exports Advance in August

WASHINGTON — The Department of Commerce reported this week that exports of industrial machinery in August were 17 per cent greater than the August, 1938, figure of $22,067,799. Leading the advance in the metal-working equipment trade, foreign sales of machine tools were largely responsible for the 14 per cent gain in exports of power-driven metal-working machinery. These increased from a value of $8,625,729 in August, 1938, to $9,870,911 in the same month this year.

Lathe shipments totaled $1,810,750 against $1,339,822; thread-cutting and automatic screw machines, up to $568,977 from $187,892; milling machines, $1,686,018 from $1,546,927; radial drills $74,503 from $17,450; planers and shapers, $338,547 from $256,416; internal grinders, $465,997 from $386,792; tool, cutter and universal grinding machines, $436,371 from $306,150; sheet and plate metal-working machines down to $612,220 from $689,867; forging machinery, $359,648 from $95,404; rolling mill machinery, down to $755,812 from $874,220; and foundry equipment, down to $120,257 from $228,787.

August exports of power-generating equipment amounted to $1,560,056, an advance of 13 per cent over the comparable figure for August, 1938, of $1,384,950. Advances in excavating and road-building equipment sent the August exports of construction and conveying machinery up 27 per cent to a value of $2,450,330.

29% Advance in Steel Carloadings is Forecast

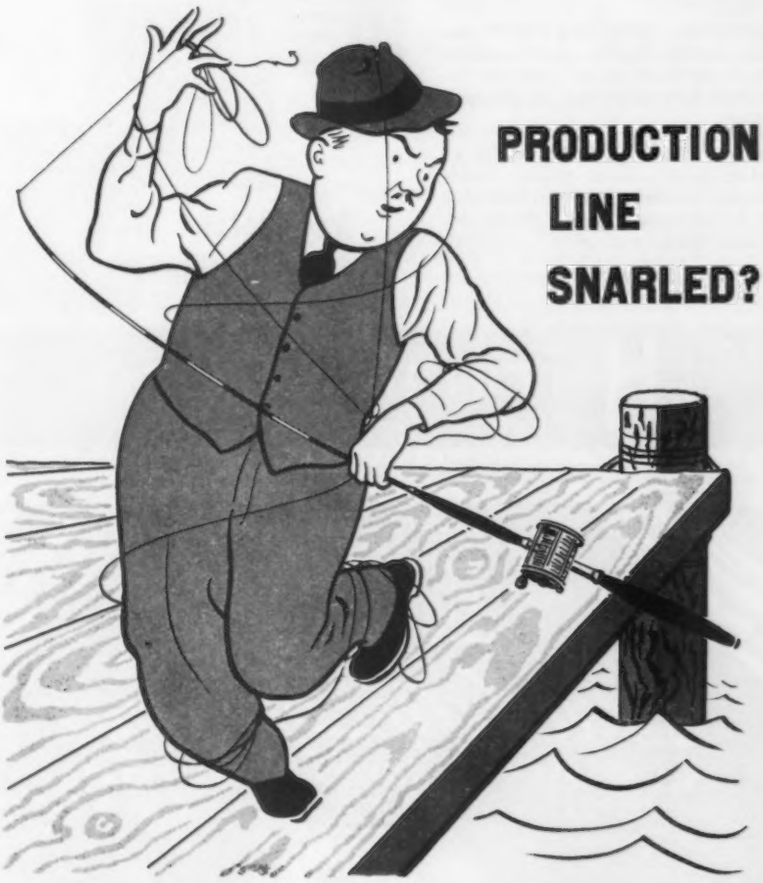
WASHINGTON — Estimates compiled by the 13 Shippers' Advisory Boards of the Association of American Railroads and based upon replies to questionnaires received before the sudden increase in car loadings subsequent to the declaration of war in Europe, are that freight car loadings of 29 principal commodities will be 5,784,468 cars in the fourth quarter of 1939 as compared with 5,083,573 actual car loadings for the same classes of commodities in the corresponding period last year, an increase of 13.8 per cent. It was estimated that the greatest rate of increase—26.2 per cent—would occur in the northwest; 22.4 per cent in the Great Lakes region; 16.2 per cent in the Ohio Valley; 16 per cent in the Mid-West; and 13.9 per cent in the Atlantic states.

Iron and steel car loadings, it was estimated, will increase to 388,127 in 1939 as compared to 300,827 in 1938, an increase of 29 per cent. Shipments of machinery and boilers were estimated at 24,419 cars for 1939, a 14.6 per cent increase over the 21,314 cars recorded for 1938. Loading of ore and concentrates is expected to be 59.1 per cent greater; agricultural implements and vehicles, up 16.9 per cent; and automobiles, up 12.7 per cent.

In view of developments in Europe, the Advisory Boards are considering a recanvass early in October so that a supplemental forecast can be issued.

Imports at Philadelphia

PHILADELPHIA—The following iron and steel imports were received here during the past week: three tons of steel bands and 54 tons of structural shapes from Belgium.



You can't catch fish with a snarled line. When your production line is tangled with metal cleaning troubles you don't get results either.

Many metal finishers have a formula that is bringing them metal cleaning satisfaction—and it's no secret. When a problem crops up, they call in the Wyandotte service man. They find it often saves time, money and labor to be able to call on his experience and the metal cleaning knowledge the Wyandotte organization has accumulated throughout more than a third of a century of service.

***Your* Wyandotte Service Representative is always on call. Get in touch with him before a problem gets serious.**

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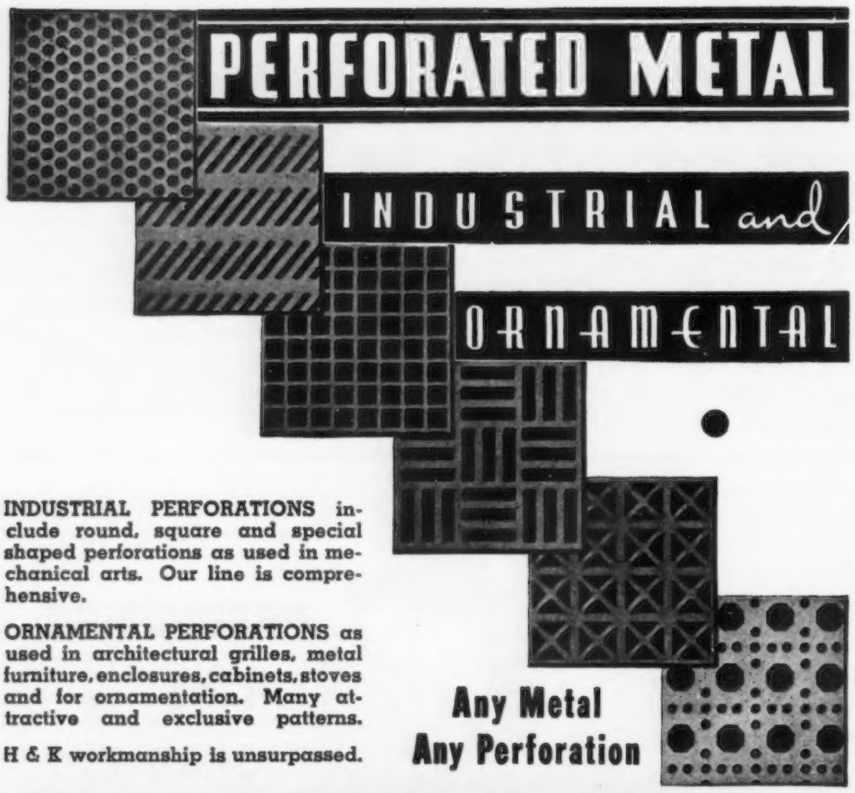
WYANDOTTE MICHIGAN
SERVICE REPRESENTATIVES IN 88 CITIES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NLRB Orders Workmen At Two Plants Rehired

WASHINGTON—The National Labor Relations Board has issued an order based upon a stipulation requiring the Titan Valve & Mfg. Co., Cleveland, to discontinue the alleged practice of interfering with the rights of employees to self-organization and to end alleged efforts to discourage membership in the AFL's International Association of Machinists, District 54. The company agreed, according to an NLRB announcement, to reinstate 44 designated employees if consistent with the present personnel needs.

The Reynolds Spring Co., Jackson, Mich., also was ordered by the board to reinstate two employees and to bargain upon request with the CIO's United Automobile Workers of America. At the same time the board announced certification of the CIO automobile union as the sole collective bargaining agency for a majority of production and maintenance employees of the Brewster Aeronautical Corp., Long Island City, N. Y.

Sun Petition Dismissed

The NLRB also announced dismissal of a petition calling for investigation and certification of representatives of employees of the Sun Shipbuilding & Dry Dock Co., Chester, Pa., which had been filed by the Pattern Makers' League of Philadelphia. The protesting union had lost an election held in August but the board held its objection to be without merit.

The board has granted the request of the AFL's International Association of Machinists, Local 1139, to withdraw a petition calling for investigation and certification of representatives of employees at the Yates-American Machine Co., Beloit, Wis. At the same time the board, acting upon the request of the AFL group and also on behalf of the CIO's Amalgamated Association of Iron, Steel and Tin Workers, vacated its direction of election of Dec. 23, 1938.

Italy Forced to Import More Scrap As Ore Output Sags

WASHINGTON—Reports to the Commerce Department showed this week that Italy's output of iron ore has declined and scrap imports have increased despite efforts to increase domestic production of iron ore and to curtail imports of iron and steel scrap.

Italian production of iron ore, including manganiferous ore, is shown

to have declined from 1,016,027 metric tons in 1937 to 1,011,451 tons in 1938 and to have continued this trend in 1939 when five months' output of 353,-358 tons was short of the 461,380 tons reported mined in the comparable period of 1938. Manganiferous ore production amounted to 4120 tons against 7427 tons in the preceding year. The output of pyrites displayed an opposite trend, increasing to 417,-538 tons from the 1938 figure of 397,-018 tons, the Department said.

Italian imports of iron and steel scrap increased from 537,000 tons in 1937 to 601,000 tons in 1938. The increase over the first half of 1939 as compared with the corresponding period of 1938 was considerably more marked, the total for the earlier period having been recorded at 271,848 tons and that for the latter at 384,475 tons.

Denmark Permits Overtime For 40,000 Steel Workers

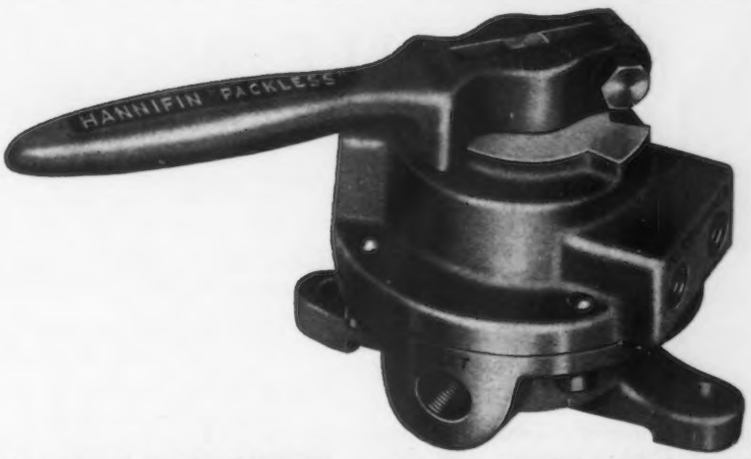
WASHINGTON — Forty thousand steel workers, or approximately 10 per cent of the total number of employees in Denmark, will be exempted from overtime restrictions by action of the Minister of Social Affairs in Copenhagen. Commerce Department reports show that both employers and trade unions have been dissatisfied with the law curbing overtime work since it was passed in 1937. Exemptions for other industries are expected eventually to be made, the report said.

Canadian Steel Output In August at 69%

PRODUCTION of ingots and steel for castings in Canada in August was at approximately 69 per cent of capacity, while pig iron and ferroalloy output was at 54 per cent of capacity, according to statistics released by the Dominion Bureau of Statistics.

On a tonnage basis, Canada produced 122,019 tons of ingots and steel for castings as compared with 111,419 tons in July and 82,871 tons in August, 1938. Pig iron output was 69,520 tons, as against 59,587 tons in preceding month and 49,477 tons in August, a year ago. August ferroalloy production totaled 3313 tons.

Ore consumed by Dominion blast furnaces in August amounted to 116,-360 tons, of which 110,885 tons was imported. On August 31, six blast furnaces were in blast, a gain of one stack in the month. Canada has a total of 10 blast furnaces capable of producing 3975 tons of iron a day.



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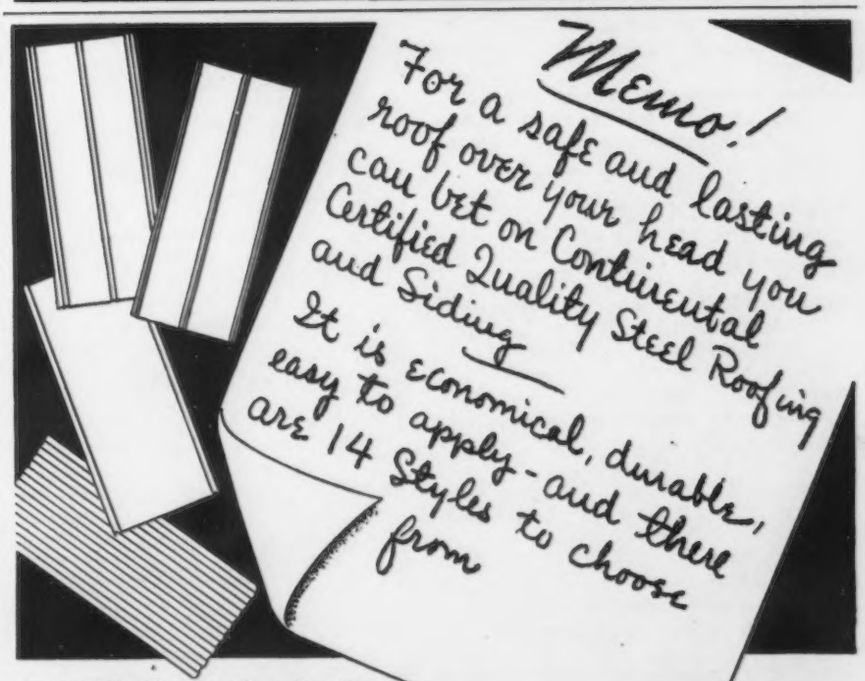
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Plants at Kokomo, Indianapolis, Canton

. . . THE NEWS IN BRIEF . . .

Germany may run short of iron ore as war progresses.—**Page 49.**

2000 Canadian plants have been surveyed for possible war production. —**Page 49.**

SWOC asks Labor Board to order employees' election for Crucible Steel Co. of America.—**Page 50.**

B. F. Fairless tells Association of Iron and Steel Engineers that war solves nothing, urges engineering approach to international problems.—**Page 50.**

Auto assemblies at highest point for corresponding date since 1929.—**Page 52.**

Disbanding of War Resources Board puzzles Washington.—**Page 56.**

Steel Institute opposes concessions on tariffs covering imports of Belgian iron and steel products.—**Page 58.**

Maritime Commission ships to be ordered by Jan. 1 to require 60,000 tons of steel.—**Page 60.**

Glasgow shipyards now building 22 warships, including one 40,000-ton battleship.—**Page 61.**

Canada licenses exports of many commodities to safeguard domestic and military requirements.—**Page 61.**

TNEC calls steel witnesses to appear at public hearings beginning Oct. 16.—**Page 61.**

Government contracts for iron and steel products in week ended Sept. 23 total $2,036,057.—**Page 62.**

Navy bureau awards long list of contracts for supplies and equipment. —**Page 63.**

Germany has not yet delivered rail equipment orders placed by Chile in 1937.—**Page 64.**

Farm equipment exports in August 3 per cent below corresponding month of last year.—**Page 64.**

Belgium requires permits for export of iron ore and metals.—**Page 64.**

Egypt joins countries licensing exports of essential materials.—**Page 64.**

Shippers (before war upswing began) forecast 29 per cent increase in steel carloadings in fourth quarter.—**Page 67.**

August exports of industrial machinery 17 per cent heavier than in like month of 1938.—**Page 67.**

Labor Board orders workers at two plants reinstated.—**Page 68.**

Italy forced to import more scrap as ore output sags.—**Page 68.**

Canadian steel output in August at 69 per cent.—**Page 69.**

Denmark permits overtime for 40,000 steel workers in that country; other exemptions expected.—**Page 69.**

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MEETINGS

Oct. 5 to 7—Society of Automotive Engineers, aircraft production meeting, Los Angeles.

Oct. 6 and 7—Foundry Equipment Manufacturers Association, White Sulphur Springs, W. Va.

Oct. 16—Society of Automotive Engineers, annual dinner, New York.

Oct. 17 — National Association of Sheet Metal Distributors, Atlantic City, N. J.

Oct. 16 to 20—National Safety Congress and Exposition, Atlantic City, N. J.

Oct. 23 to 27—National Metal Congress, Chicago.

Oct. 24 to 26—Purchasing Agents Association of Baltimore, products exhibit, Baltimore.

Three Society of Metals groups announce 1939-1940 program.—**Page 72.**

Cooperweld Steel Co. to erect new plant at Warren, Ohio.—**Page 72.**

British industry on a war footing; conversion has been easier in steel than in some other industries.——**Page 73.**

Gear makers complete meeting program.—**Page 73.**

American Welding Society, Pittsburgh, section, to open its 1939-1940 season on Oct. 18.—**Page 74.**

U. S. industry lacks skilled men, machinery necessary to restore 1929 living standard, economists say.—**Page 74.**

Triplex Machine Tool Corp. opens New York showroom.—**Page 74.**

Fourth annual meeting of the Air Hygiene Foundation will be held Nov. 14-15 at Pittsburgh.—**Page 74.**

Jones & Laughlin Steel Corp. returns salaried employees to full time because of business upturn.—**Page 74.**

American Society of Tool Engineers revises program for semi-annual meeting at Cleveland.—**Page 75.**

Thirty-eight Allis-Chalmers veteran employees awarded booklets containing their photographs and biographies.—**Page 75.**

Steel plant equipment inquiries increase in September, according to United Engineering & Foundry Co. official.—**Page 75.**

Armco Railroad Sales Co. to distribute products formerly marketed by Ingot Iron Railway Products Co. —**Page 75.**

Steel producers and scrap brokers meet to consider the scrap situation.—**Page 75E.**

Domestic machine tool orders for first half of September were double those of August.—**Page 96.**

Spreading labor disputes in Detroit area threaten to disrupt back-to-work movement.

Steel exports in August advance to 185,183 tons.

Prices show industry acts in public interest.

Now if you want details . . .

here they are

Twin Disc MT Clutches are furnished either as a single, multiple disc clutch or as a double multiple disc clutch, called a duplex.

The duplex model consists of two single clutches combined in one unit, having a common engaging cone and operating lever.

Both the single and the duplex clutches are available in either "dry" type or in "oil" type.

Dry type clutches are particularly suitable where a compact clutch of high torque capacity with comparatively low operating pressures is required: cut-off service for example. The dry type may also be used as operating clutches where frequency of use does not dictate a clutch of the oil type.

In the "dry" type Twin Disc MT Clutch, the friction surfaces of the driving plates are asbestos and the driven plates are of saw steel, heat-treated and ground.

In the "oil" type clutches, the driving plates are of hard, phosphor bronze, perforated with oil release holes and the driven plates are of saw steel with radial grooves for quick oil release. This assures positive, smooth engagement . . . a minimum of drag between the clutch plates when the clutch is operating in disengaged position.

There is a Model in Twin Disc MT Clutch line that has a place on your Machine Tool because it will add to the performance of your machine. It will do its job with a minimum of attention because it is "built-for-the-job" by clutch specialists. Why not ask our Engineering Department for recommendations?

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● **California:** Los Angeles, Charles W. Carter Co.; San Francisco, Charles W. Carter Co. **Colorado:** Denver, Liberty Truck and Parts Company. **Illinois:** Chicago, Motive Parts Co. of America; Chicago, Western Contractors Supply; Chicago, Wisconsin Industrial Parts. **Massachusetts:** Boston, Rapp-Huckins Co., Inc. **Kansas:** Great Bend, Scheufler Supply Co. **Maine:** Portland, Southworth Machinery Co. **Michigan:** Detroit, Whitney Brothers. **Minnesota:** St. Paul, Truck Parts, Inc. **Missouri:** St. Louis, Auto Parts Company. **New York:** Buffalo, Edward W. Rode; New York City, Twin Disc Clutch Parts & Service of New York, Inc. **Ohio:** Cincinnati, C. McCash; Cleveland, Industrial Engine Parts. **Oklahoma:** Tulsa, Twin Disc Clutch Company. **Oregon:** Portland, Berg Evans Chain Company. **Pennsylvania:** Pittsburgh, Contractors Equipment Service Company; Philadelphia, Maerky Machine Works. **Tennessee:** Knoxville, Automotive Equipment & Supply Co. **Texas:** Dallas, Twin Disc Clutch Company; Fort Worth, John Muller Company; Houston, Portable Rig Company, Inc.; Houston, John Muller Company. **Utah:** Salt Lake City, Lund Machinery Company. **Virginia:** Richmond, Standard Parts Corporation. **Washington:** Seattle, Berg Evans Chain Company.

Copperweld to Build Steel Plant in Ohio

PITTSBURGH—The new Copperweld Steel Co. plant for the manufacture of 100,000 tons of alloy steel per year (IRON AGE, Sept. 21, page 97) will be erected at Warren, Ohio, according to S. E. Bramer, president, Copperweld Steel Co., who said the company was forced to locate the new plant at Warren because there was insufficent land available at Glassport to permit installation of furnaces and rolling mills and provide for the possible need of future expansion.

It was disclosed that Copperweld has acquired the assets of the American Puddled Iron Co. at Warren and, using these buildings as a nucleus, will erect the plant on a 423-acre property. Mr. Bramer allayed fears of Glassport officials that the location of the new steel plant at Warren would eventually mean that Copperweld would move its Glassport works to the Ohio city by saying that no such move was considered.

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Our exclusive process of PRE-ALLOYING the basic metals prevents the formation of harmful oxides . . . assures uniform structure throughout the bearing. Likewise, it permits the introduction of lead which provides quick, easy conformability and prevents galling or freezing to the shaft. Add to this the fact that LEDALOYL contains oil . . . up to 35% by volume . . . and you realize why LEDALOYL operates so *quietly*, so efficiently and for such a long period of time.

LEDALOYL is the only self-lubricating bearing with *controlled lubrication*. Millions of pores, evenly spaced, provide pin-point lubrication to the entire bearing area. The minute size of the pores *meters* the lubricant in the exact amount required for efficient operation at all speeds and loads. Likewise, the bearing absorbs the oil when the shaft is at rest. Thus you have the right amount of oil . . . in the right place . . . at the right time.

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Three Society of Metals Groups Announce Programs

ANNOUNCEMENTS of 1939-40 programs by three local groups of the American Society of Metals in the Detroit, Toledo and Saginaw Valley areas have been made simultaneously.

The first meeting of the Detroit chapter will be held at Ann Arbor, Mich., Saturday, Oct. 7. A visit to the engineering research laboratory of the University of Michigan in the morning will be followed by group attendance at the U. of M. football game in the afternoon and a meeting in the evening. Robert B. Hall, professor of geography, U. of M., who has been studying the sources of strategic materials produced by the armies and navies of the world, will present his conclusions as applied to the American armed forces. The title of his address will be "American Dependence on the Pacific Basin."

The first meeting of the Toledo group will be Nov. 20 at the Hillcrest Hotel with Major G. A. Roush, editor, *Mineral Industry*, as the speaker. His subject will be "Strategic Mineral Supplies in the Steel Industry."

The Saginaw Valley group will meet at the Dow Chemical Co., Midland, Mich., on Oct. 17, to hear L. C. Stewart speak on "Dow Products as Related to the Auto Industry."

J-Metal Tool Manual

DISCUSSION of various tool bit holders and adaptors and description of the new Haynes Stellite wear strips for driving and pilot bars are included in a revised edition of the comprehensive operating manual entitled "Haynes Stellite J-Metal Cutting Tools," published by the Haynes Stellite Co., Kokomo, Ind. The chapter on tool holders and adaptors presents designs and specifications for holding devices which allow J-metal solid tool bits to be salvaged and used until they become extremely short. Other holder designs enable square and rectangular tools of smaller cross sections to be used. The manual also gives speeds and feeds for J-metal tools in machining many materials under a variety of conditions, as well as specifications for standard tool bits, welded tip tools, milling cutter blades, and special purpose tools.

Gear Makers Complete Meeting Program

A COMPREHENSIVE program of addresses, technical papers and technical committee reports has been planned for the meeting of the American Gear Manufacturers Association to be held at Whitcomb Sulphur Springs, St. Joseph, Mich., Oct. 16-18.

Technical papers include: Superfinishes, by John Hutchinson, Chrysler Corp.; Modern Trends in Nickel Steel and Cast Iron Materials, by C. M. Schwitter, International Nickel Co.; Inspection Tolerances for Gears, by Granger Davenport, Gould & Eberhardt; Proportions of Industrial Gears by W. P. Schmitter, Falk Corp.; Specifications for Gear Lubricants, by H. A. McConville, General Electric Co.; and Gear Grinding, by John Dixon, Pratt & Whitney Co.

Industry's contribution to civilization will be discussed by S. Wells Utley, president, Detroit Steel Casting Co., and gear noise will be discussed and demonstrated by Prof. F. A. Firestone, University of Michigan. A paper on experiences in the gear industry by U. Seth Eberhardt, Newark Gear Cutting Machine Co., will be a feature at another session. C. F. Goedke, Ganschow Gear Co., Chicago, is president of the association, and J. C. McQuiston, Wilkinsburg, Pa., is manager-secretary.

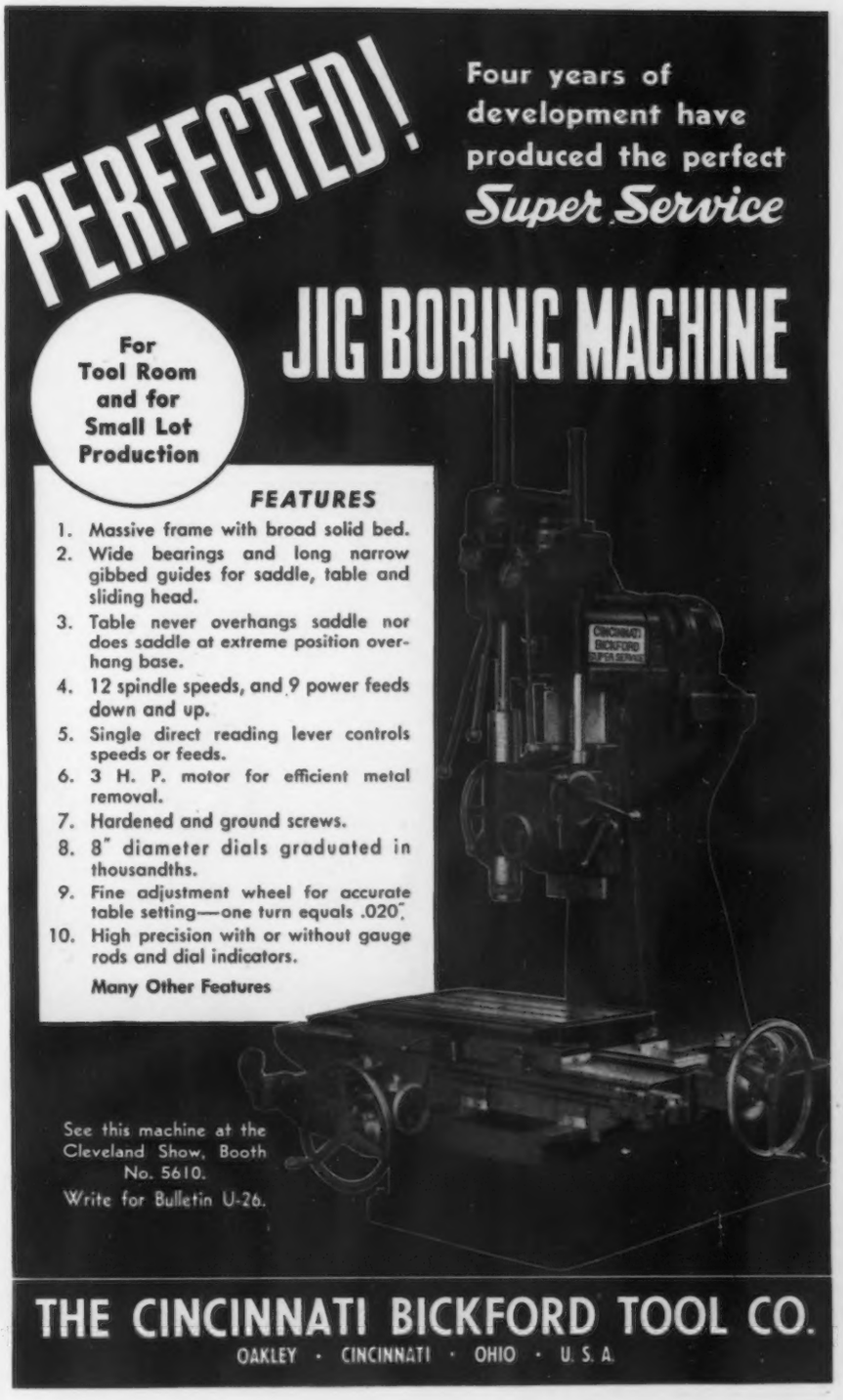
British Industry On a War Footing

LONDON—It has been decided, for the duration of the war, to discontinue the monthly output figures of the British iron and steel industry. It is, however, understood that steel production in August showed a further improvement in the daily output rate compared with July. This does not necessarily mean that the absolute output was larger, as August is the chief vacation month for the industry, but it does mean that the daily rate was higher than ever before. Moreover, it may be regarded as certain that, with no holidays intervening, the actual output of this main war industry of the United Kingdom will now rise rapidly to levels never touched before.

The process of converting the basis of the steel industry's economy from that of near-war to full war conditions is proceeding smoothly. Thanks partly to the fact that it has for some time been heavily engaged in defense work and partly to the existence of a highly organized central body this process of transition has been easier for the iron and steel than for other heavy industries.

Much of the existing organization of the British Iron and Steel Federation has been taken over by the Ministry of Supply and it has been possible to establish from within the industry what should be a watertight organization by which the inequities of the Ministry of Supply set up in the World War should be eliminated.

The government has, of course, a lien on the entire output capacity of the industry and it will decide the order of priority from time to time in accordance with the loading position of the various sections.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4. 12 spindle speeds, and 9 power feeds down and up.
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Many Other Features
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THE CINCINNATI BICKFORD TOOL CO.
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Air Hygiene Foundation Meeting on Nov. 14-15

THE fourth annual meeting of the Air Hygiene Foundation will be held at Mellon Institute, Pittsburgh, Nov. 14-15. Andrew Fletcher, vice-president, St. Joseph Lead Co., will discuss savings resulting from proper health precautions. A forum is planned to show that "Industrial Health Pays Double Dividends" and will be presided over by V. P. Ahearn, executive secretary, National Industrial Sand Association.

Robert J. Watt of the American Federation of Labor, and representative of the U. S. Labor Dept. at the International Labor Office, Geneva, is scheduled to speak on labor's interest in occupation disease prevention. Dr. A. J. Lanza, assistant medical director, Metropolitan Life Insurance Co., will preside at a symposium on absenteeism, intended to develop measures for companies to reduce time lost by employees through illness. Dr. R. R. Sayers of the Public Health Service and medical directors of half a dozen leading corporations will participate.

The technical program includes: Reports on the Foundation's engineering research at Harvard by Philip Drinker, chairman, preventive engineering committee; reports on the Foundation's medical research at the Saranac Laboratory by Dr. L. U. Gardner, and at the University of Pennsylvania by Dr. E. P. Pendergrass and Dr. Eliot R. Clark; and reports on legal developments affecting industrial hygiene during 1939, by T. C. Waters, member of the Foundation's legal committee.

J. & L. Salaried Workers Are Back on Full Time

PITTSBURGH—Virtually all salaried employees of Jones & Laughlin Steel Corp., who received a 16 2/3 per cent reduction in salary with compensating time off in February, 1938, returned to full pay and full time on Oct. 1. This action, it was said, was taken because of the increase in business.

Salaried workers of U. S. Steel Corp. and subsidiaries are being returned from a five-day week to a five-and-a-half-day week as work load conditions warrant.

Pittsburgh Section of Welding Society to Meet

THE opening meeting of the 1939-1940 season of the Pittsburgh section of the American Welding Society will be held in Pittsburgh on Oct. 18. Virgil Whitmer, metallurgical department, Republic Steel Corp., Cleveland, will speak on "Welding Problems in Stainless Steels in Transportation Equipment," and Howard L. Miller, metallurgical department, Republic Steel, Cleveland, will speak on "Problems in Welding Low Alloy High Tensile Steels in Transportation Equipment."

Triplex Machine Tool Corp. Opens New York Showroom

AS a result of the cancellation of the Machine Tool Show in Cleveland, the Triplex Machine Tool Corp. is staging a local show at its newly opened showroom at 106 Lafayette Street, New York, the largest display space for new machinery in the city. From Oct. 9 to 21 inclusive, this machine tool dealer will have on exhibition about 40 machines, all power driven. The exhibit will be open from 9 a. m. to 10 p. m. during these two weeks.

U. S. Industry Lacks Skilled Men, Machines, Writers Say

THE United States has neither the mechanical equipment in place nor the skilled labor supply necessary to provide today the standard of living of 1929, a booklet being distributed by Farrel-Birmingham, Inc., Ansonia, Conn., asserts. The booklet, entitled "Machinery's Part in Future Social Progress," and written by Allen W. Rucker and N. W. Pickering, business economist, notes that:

"There is always sufficient shifting and displacement of labor due to technological change to lend some color to the theory of machine-caused unemployment. It is natural for individuals affected to conclude from their limited observations that the machine causes economic unemployment. Actually displacement of labor at the point of machine use is more than counterbalanced by the addition of labor at the point of machine construction, transportation, installation, maintenance and replacement, as well as at the point of production of added buildings and power necessary."

Allis-Chalmers Veterans Are Given Own Biographies

MILWAUKEE — Thirty-eight men, all of whom have worked for Allis-Chalmers Mfg. Co., for 50 years or more, last week received booklets containing individual photographs and biographies of each man. The booklet opens with a dedication signed by General Otto H. Falk, chairman; Max W. Babb, president, and William Watson, vice-president in charge of manufacturing. In addition, each man was presented with an engraved gold watch.

Armco Railroad Sales Expands its Activities

LOGAN T. JOHNSTON, president of Armco Railroad Sales Co., which recently acquired the railroad sales business of Ingot Iron Railway Products Co., announces that Armco will now distribute products formerly marketed in the railroad field by the Ingot Iron Railway Products Co., including Armco ingot iron culverts, multiple pipe and arches, tunnel lining, metal cribbing, spiral welded pipe, perforated pipe, and other allied Armco products.

District offices and managers of Armco Railroad Sales are: H. M. Arrick, St. Louis; R. Y. Barham and Eugene Harbeck, Chicago; G. R. Betts, Minneapolis; W. N. Crout, Cleveland; R. B. Faries, Philadelphia; W. J. Kelley, Denver; W. P. Lipscomb, Richmond, Va.; N. A. Powell, Houston; W. B. Quail and W. A. Dibblee, New York.

Mill Equipment Inquiries Increase in September

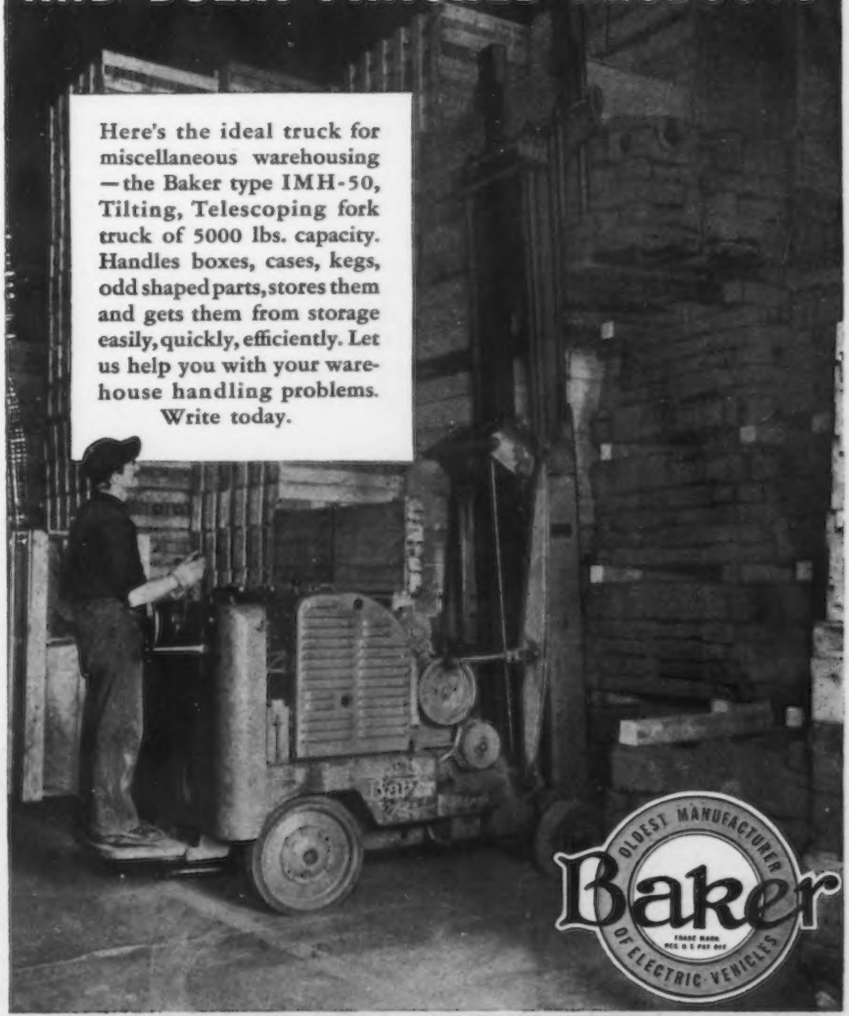
PITTSBURGH—K. C. Gardner, vice-president, United Engineering & Foundry Co., reports inquiries for steel mill equipment from both domestic and foreign sources have increased "tremendously" since the early part of September.

"The steel industry in the United States today is tackling a problem which remained unfinished during the period of wide strip mill construction," Mr. Gardner said. "Many steel company budgets at that time did not include the full complement of finishing facilities at the 'other end' of these big strip mills. The steel companies are now expanding their facilities to produce a wide variety of high-grade flat steel products after the strip leaves the hot mills."

Tool Engineers Revise Cleveland Program

THE rearranged program of the semi-annual meeting of the American Society of Tool Engineers at Cleveland, Oct. 6 and 7, has been announced. Because of the cancellation of the Machine Tool Show, the ASTE has arranged four tours of Cleveland factories. Tour No. 1 will be to the Acme Machinery Co., White Motor Co. and Cleveland Graphite Bronze Co. Tour No. 2 will be to the National Acme Co., Parker Appliance Co., Acme Machinery Co. Tour No. 3 will be to Cleveland Graphite Bronze Co. and White Motor Co. Tour No. 4 will be to the National Screw and Mfg. Co. and Republic Steel Corp. All of these tours start at 9 a. m. on Friday morning, Oct. 6. The semi-annual dinner and meeting will be held Friday evening. On Saturday a symposium on bearings, with four speakers on the subject of bearings, will be staged.

THE SAME BAKER TRUCK HANDLES HEAVY, ROUGH CASTINGS AND BULKY FINISHED PRODUCTS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. . . PERSONALS . . .

CHARLES A. CHAYNE, chief engineer of the Buick division of General Motors Corp., has announced five promotions in the engineering department to meet the broadened scope of the department's design and experimental activity and further to organize operations for the coming season. The five men named, JOHN DOLZA, EDWARD T. RAGSDALE, VERNER P. MATHEWS, JAMES H. BOOTH and EDWARD F. REYNOLDS, will assume their functions immediately. Mr. Dolza, formerly assistant chief engineer, becomes special project engineer assigned to advance development problems. Mr. Ragsdale, for the past several years Buick's body engineer, is promoted to assistant chief engineer, retaining, however, direct supervision over all body and sheet metal engineering activities. Mr. Mathews, an engineer in the chassis division for the past 12 years, becomes chassis engineer in charge of all chassis engineering activities. Mr. Booth, who since 1935 has specialized in steering, suspensions and other phases having to do with ride and handling, becomes chassis division engineer in charge of that phase of car design and construction, and Mr. Reynolds, formerly assistant body engineer, becomes body division engineer.

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AVERY C. ADAMS assumed his title and duties as vice-president in charge of sales, United States Steel Corp. of Delaware, on Oct. 2. Mr. Adams, whose election was announced in THE IRON AGE, Sept. 14, also becomes a member of the executive committee and board of directors.

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FRANK C. MILLER has been appointed western manager of sheet and strip sales, with headquarters in Chicago, of Youngstown Sheet & Tube Co., Youngstown. The company recently completed the installation of continuous hot and cold strip mills at its Indiana Harbor plant. JOHN M. TUTHILL, special sales representative of the flat rolled division, has been appointed assistant manager of flat rolled sales, with headquarters at the general offices in Youngstown.

ARTHUR N. VOGT was recently appointed district sales manager of the Youngstown sales district.

J. F. HEIL has been appointed district sales manager at San Francisco, succeeding A. G. OAKLEY, who becomes district sales manager of the southern California territory, with headquarters at Los Angeles.

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E. M. SCHROCK of the Aliquippa works metallurgical division of Jones & Laughlin Steel Corp., Pittsburgh, spoke before a meeting of the Pittsburgh chapter of the American Society for Metals last week on the application of statistics to metallurgical problems. He discussed the background, techniques, organization, and possibilities of practical and workable programs for statistical analyses of metallurgical problems.

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R. B. MOIR, who resigned recently as chief engineer of W. A. Jones Foundry & Machine Co., has become associated with Foote Brothers Gear & Machine Corp., Chicago, as director of sales research and engineering development.

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L. A. VER BRYCK has been appointed assistant manager, welded fabric and construction products sales, Pittsburgh Steel Co., Pittsburgh. He has been connected with the sales department of this division since 1928, with the exception of a period of about a year when he was with the Wheeling Corrugating Co.

ROBERT L. GLOSE continues as manager of welded fabric and construction products sales.

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DAVID FINDLAY, heretofore vice-president and general sales manager of the L. S. Starrett Co., Athol, Mass., has been elected president, succeeding FRANK A. BALL, who has been made chairman of the board. ATHUR H. STARRETT, formerly second vice-president, has become vice-president, and WILLIAM J. GREENE, who has been Eastern sales manager, has been made general sales manager of the company. LLOYD I. WILLIAMS, formerly Pacific Coast representative, has been appointed Pacific Coast sales manager. In the manufacturing department, R. J. O. SIMPSON retires as superintendent to become consulting engineer; WILLIAM D. STARRETT, formerly assistant superintendent, has been made superintendent, and WILLIAM A. THORP, who has been engineer, becomes assistant superintendent.

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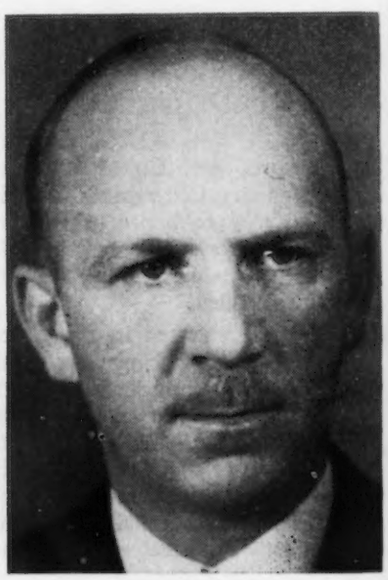
GEORGE W. ROMNEY has been selected by the board of directors of the Automobile Manufacturers Association as manager of the Detroit office. The AMA is moving its headquarters to the New Center Building, Detroit. Mr. Romney has been representative

JOHN DOLZA, project engineer of Buick Division, General Motors.



EDWARD T. RAGSDALE, Buick's assistant chief engineer.

of the aluminum industry at Washington for several years.

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WILLIAM E. FERTEL, who has been associated with the Fertel Dangler & Wilson Co., Cleveland, and the David J. Joseph Co., Cincinnati, for many years, is now associated with the Philip W. Frieder Co. Cleveland iron and steel scrap broker.

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JOHN S. BARTEK, formerly chief engineer of the Modern Tool Works, Rochester, N. Y., has been added to the staff of the Pioneer Engineering & Mfg. Co., Detroit. Mr. Bartek was with Pioneer previous to his connection with Modern Tool.

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C. M. CAMPBELL, of the Chevrolet transmission plant, Saginaw, Mich., has been named chairman of the Saginaw Valley Group of the Detroit chapter of the American Society for Metals. C. A. TOBIAS, of the General Motors Institute, Flint, is secretary-treasurer of the Valley group.

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CHARLES E. DENNEY, president-trustee of the Erie Railroad, last week was named president of the Northern Pacific Railroad Co., with headquarters in St. Paul. FRANCIS J. GAVIN last week was chosen as president of the Great Northern Railway Co. The Northern Pacific and Great Northern together control the Burlington system.

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RICHARD W. YERKES, secretary-treasurer of Link-Belt Co., Chicago, since 1923, and an employee of the company since 1890, retired last week, but will continue to serve as a member of the board of directors. Mr. Yerkes will be succeeded as treasurer by HARRY E. KELLOGG, heretofore chief accountant. F. V. MACARTHUR, formerly assistant secretary, was elected secretary. MELBOURNE P. ANDERSON, formerly general credit manager has taken Mr. Kellogg's old position of chief accountant. C. W. MARUM, for 28 years a member of the company's New York office, has been named general credit manager.

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F. A. FARON, manager of the New Haven office, and E. G. DUDLEY, of the industrial department, New York district, of the General Electric Co., Schenectady, N. Y., have been named assistant managers of the industrial department of the New York district of the company.

Mr. Faron, who was graduated from Rhode Island State College in 1916, immediately entered the testing department of the General Electric Co. In 1918 he was assigned to special work in the direct current engineering department and later went with the railway engineering department. In 1927 he was transferred to the New Haven office, in charge of the transportation department and in 1936 was appointed manager of that office.

Mr. Dudley entered the testing department of the company in 1921, going to the turbine sales division the following year. In 1931 he became an industrial salesman in the New York district. He was graduated from the University of Michigan in 1918.

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RALPH E. HOUGH, assistant general manager, has been appointed general manager, Cambria Works, Bethlehem Steel Co., succeeding C. R. Ellicott who died recently. Mr. Hough had been assistant manager since 1936. He joined the Lackawanna Steel Co. in 1905 and when Bethlehem took over Lackawanna in 1922 he was named superintendent of the Bar Mills at Lackawanna. He was transferred to the Cambria plant in 1928 as superintendent of Gautier Mills. H. M. Crossett, superintendent in charge of the coke plant and blast furnaces, was appointed assistant general manager to succeed Mr. Hough.

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C. O. BUCKSOT, who has been identified with W. J. Holliday & Co., Hammond, Ind., for over 25 years, has been named vice-president and general manager of the Hammond division. LEE

VERNER P. MATHEWS, chassis engineer in charge of all chassis engineering activities.

JAMES H. BOOTH, chassis division engineer in charge of that phase of car design and construction.

EDWARD F. REYNOLDS, body division engineer.

W. F. DALY, new district manager at St. Louis for Allis-Chalmers Mfg. Co.

M. VAN DEMAN has been made sales manager in charge of warehouse steel sales of the same division.

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OTTO C. HARTIG, for 25 years connected with the Atlas Drop Forge Co., Lansing, Mich., has resigned as plant manager but will continue as secretary-treasurer and a director.

C. E. McINTYRE, new manager of the Buffalo office of Carnegie-Illinois Steel Corp., whose appointment was announced in these columns last week.

W. F. DALY has been appointed district manager of the St. Louis office of Allis-Chalmers Mfg. Co. Milwaukee. C. L. ORTH, who has been St. Louis manager for 29 years will continue in a consulting and sales capacity. Mr. Daly formerly was a member of the Allis-Chalmers staff in Chicago, specializing in power and electrical equipment, particularly turbines, condensers, transformers, switchgear and related products. Before his affiliation with Allis-Chalmers, Mr. Daly was employed by the Crocker-Wheeler Co.

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MAYO D. HERSEY, for 15 years connected with the National Bureau of Standards, Washington, has joined the staff of the Morgan Construction Co., Worcester, as research director. While with the bureau, he organized the aeronautics instruments section and later the friction and lubrication section. Mr. Hersey served for a time as associate professor of properties of matter at Massachusetts Institute of Technology and also as physicist in charge of the physical laboratory at the Pittsburgh Experiment Station of the U. S. Bureau of Mines. More recently he was head of the test department of the Kingsbury Machine Works, Philadelphia.

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VERNON E. LACOUR, assistant county agent for LaFoushe Parish, La., has been appointed farm products agent for Louisiana by Tennessee Coal, Iron & Railroad Co., Birmingham.

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GEORGE O. O'HARA, formerly with the Republic Carbon Co., National Carbon Co., Cleveland, and the Detroit Electric Furnace Co., as sales engineer, has been made sales manager of the electrode division of the Great Lakes Carbon Corp., Niagara Falls, N. Y., which has a plant under construction for the manufacture of graphite and amorphous carbon electrodes and graphite anodes.

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REGINALD R. PUTNAM, sales manager of Arthur C. Harvey Co., Allston, Mass., has been made chairman of the iron and steel group of the Greater Boston annual maintenance appeal of the Salvation Army.

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WALTER B. WESSELS, who has had a long executive experience in the enameling industry, has been appointed secretary of the Porcelain Enamel & Mfg. Co., Baltimore.

MAYO D. HERSEY, research director of the Morgan Construction Co.

RALPH WALTER YOUNG, who has been identified for over 20 years with Charles H. Besly & Co., Chicago, for the past 15 years as head of the grinder division, has been appointed general superintendent, succeeding the late John Miller, Jr. LEO E. JACOBS, formerly manager of factory sales at Chicago, has been promoted to the vice-presidency.

WALDO F. TUCKER, whose appointment as head of the Los Angeles office of Acme Steel Co., Chicago, was announced in The Iron Age, Aug. 24.

STANLEY A. KNISELY, who has been advertising manager of the Republic Steel Corp., Cleveland, since 1934, has resigned to become executive vice-president of the Associated Business Papers, Inc., New York. He started his career in newspaper work on the Canton *Daily News* and resigned as managing editor of that paper in 1917 to take the post of telegraph editor of the Cleveland *Plain Dealer*. Four years later he left newspaper work to enter the trade association field, becoming assistant secretary of the National Paving Brick Manufacturers Association and later director of advertising and research of the National Association of Flat Rolled Steel Manufacturers. Last year he was president of the National Industrial Advertisers Association.

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CHARLES F. COLBERT, JR., has been elected president, director, and a member of the executive committee of Pittsburgh Metallurgical Co., Inc., of Niagara Falls, N. Y. Mr. Colbert will have headquarters and residence at Niagara Falls.

Machine Tool Orders Soar in September

CLEVELAND—Domestic machine tool orders for the first half of September were double the total for the entire month of August, according to an industry-wide survey just completed by the National Machine Tool Builders' Association, Cleveland. Foreign orders during this period likewise showed a very substantial increase.

"Domestic orders," Wendell E. Whipp, president of the Association, said today, "are coming in from a wide variety of machine tool using industries, and apparently are reflecting, for the most part, the expectation of increased production for fulfilling the normal peace-time needs of the country. While a share of the increased domestic business, such as that coming from the aircraft industries, shipbuilding and the Government, is founded upon considerations of national defense, the major portion has come from such widely diversified fields of manufacture as the construction industries, the railroads, textile and food machinery, electrical appliances, automotive equipment, office equipment and many others which have no direct relation to the war situation.

"For some years in this country machine tool replacement has lagged far behind obsolescence. The need for new machine tools has been steadily accumulating. It is not surprising, therefore, that at the first sign of a business upturn, the manufacturers of this country have begun to place machine tool orders designed to modernize their plants.

"In spite of the sudden increase in demand, there has been no general increase in the prices of machine tools. In certain cases, particularly with respect to foreign orders, some prices have been advanced. It is my belief, however, that machine tool builders generally are making every effort to retain present price levels and that such price increases as may materialize will be limited to those made absolutely necessary by increased production costs."

Lincoln Electric Pledges Conservative Price Policy

THE Lincoln Electric Co., Cleveland, has issued a statement of policy with respect to prices for its products. Stating that much of the post-war troubles of recent years would have been eliminated by "a more foresighted policy on the part of manufacturers and distributers," the company declares that "before such an inflationary cycle of prices is again started, we publicly pledge ourselves, so far as possible, to maintain present prices."

Further, the company declares that "if the materials we buy are increased in price, or the cost of labor is increased, then we pledge ourselves to raise selling prices no more than the bare increase in cost of raw materials and labor going into our products."

SWOC Asks NLRB to Order Crucible Steel Election

A LABOR Board election at the nine plants of the Crucible Steel Co. of America has been asked by the Steel Workers Organizing Committee in a petition filed with the regional office of the National Labor Relations Board at Pittsburgh. The company has about 12,000 employees.

Jones & Laughlin Buys Barrel Plant

PITTSBURGH—The asphalt drum and bilge barrel plant of the Standard Oil Co. of New Jersey, located at Bayonne, N. J., has been purchased by the Jones & Laughlin Steel Corp., Pittsburgh. This acquired plant will be operated under the name of the Bayonne Steel Barrel Co.

Arthur G. McKee Finds Increase in Inquiries

CLEVELAND—A "decided increase" in domestic inquiries, both in the oil refinery and iron and steel divisions, is reported by Robert E. Baker, secretary, Arthur G. McKee & Co., Cleveland engineers and contractors, in a letter to stockholders under date of Sept. 20.

"Foreign inquiries also constitute a large part of potential new business," he continued. "It appears likely that we may presently see marked increase in our domestic business," said Mr. Baker, "both in rehabilitation of existing plants and construction of new ones. The extent to which that will occur will, we believe, be determined to a greater extent by political conditions and legislative enactments in the United States than by the war."

The company's largest foreign contract, which was at Scunthorpe, in England, was completed early in September. The company's total dollar volume of new business taken up to Sept. 20 this year was approximately twice that in the same period of 1938.

Former Republic Steel Men Organize Fabricating Company

CLEVELAND—Three former employees of Republic Steel Corp. have organized a new company, United Steel Fabricators, Wooster, Ohio, to engage in the steel business.

According to present plans, the plant left idle by the United Engineering & Foundry Co.'s moving of machinery from its Wooster plant to Japan will be utilized.

Listed as officers of the new company are: W. C. Martin, president; W. F. Schulz, vice-president, and V. K. MacLeod, secretary-treasurer. Mr. Martin formerly was chief engineer of the Toncan Culvert Manufacturers' Association; Mr. Schulz was employed in the product development division of Republic and Mr. MacLeod was in the sales development division.

Steel Producers and Scrap Brokers Meet to Consider Scrap Situation

A GROUP of independent steel producers, including two or three in the Middle West and a number in the East, met in New York last week to consider the scrap situation both with respect to the rapidly rising prices of the past few weeks and the possibility of a shortage of the No. 1 grade.

The steel people later met with a group of scrap brokers, including those who have been engaged in exporting scrap to Europe and Japan.

It was contended by the steel group that heavy exports of scrap in recent years have been a contributing factor in the recent sharp price rise.

Exporters have not completed their contracts with the International Scrap Cartel, and, though the cartel has officially ceased to function, it is probable that the British, who made the purchases on behalf of all members of the cartel, will insist on completion of the contracts, since the No. 1 heavy melting steel was sold at $15 f.a.s., a low price compared with today's quotations.

It is considered doubtful that scrap exporters would take contracts for forward delivery under today's uncertain conditions; hence scrap exports may decline sharply when present contracts have been completed. The Japanese have for some time past been buying on a month-to-month basis.

No Immediate Congressional Action on Scrap Likely

WASHINGTON — The White House suggestion that exports of strategic and critical war materials be voluntarily curbed in the interest of national defense, made last week at a Presidential press conference at the request of the War and Navy departments, is interpreted by some members of Congress as a forerunner to possible legislation aimed at restricting the exportation of materials to be purchased for storage by the Government.

Coming at a time when the Treasury has invited bids on manganese, chrome ore and tungsten in the first step taken under the Strategic and Critical Materials Act, Senator Thomas, Democrat of Utah and author of the law, regards the Presidential remarks as paving the way for possible Congressional action particularly if War and Navy department circles continue to be concerned over queries coming in from foreign sources. The Senator told THE IRON AGE that he does not consider it unlikely that the list of materials on which an export restriction might be asked eventually may be extended to those not now defined as "strategic and critical" such as scrap iron and steel. He emphasized, however, that such a development is necessarily a long-range proposition and is largely dependent upon the duration of war in Europe.

The Senator, who as chairman of a Military Affairs sub-committee conducted hearings two years ago on several bills to license scrap exports, said that he knew of no move on foot to revive the measures, adding that current agitation for restricting scrap exports is exclusively confined to peace groups concentrated on the Pacific Coast. He recalled, however, that both War and Navy departments, while they never actively engaged in pushing scrap licensing proposals, approved the measures two years ago. It was his observation that both conceivably might maintain a more favorable attitude on such legislation today in view of world events. Senator Thomas said he had heard of no Government officials entertaining any belief that there is danger of a serious scrap shortage.

From other Government sources it has been learned that a proposal for restricting scrap exports by invoking a quota system, advanced several months ago in high Administration quarters, has been lying dormant since. The idea was reportedly frowned upon by some members of a special committee named to study the proposal and the committee, if it still is in existence, has held no further meetings.

Action Possible in January

The State Department was generally credited with having blocked scrap licensing legislation and some Government officials insist that the department has not changed its attitude on the subject. It is recalled, however, that the State Department, in effect, opened the way for an embargo, at least against Japan, when it served notice last August that this country was abrogating the 1911 treaty of trade and commerce with Japan. This action was taken after some Congressional authorities had expressed the conviction that the so-called Pittman resolution was in violation of the 1911 treaty. The resolution, which presumably is to come up for consideration early next January, aims to restrict or prohibit exports of arms, ammunition and implements of war, as defined under the present neutrality law, as well as "iron, steel, oil, gasoline, scrap iron, scrap steel and scrap metal containing a combination of iron and steel and other metals, or any combination of metals."

The proposal for a scrap embargo based on a quota system, made at a time when the Administration was talking about certain steps short of war which could be taken against aggressor nations, was subsequently overshadowed by complications in Europe, but many observers see no reason to believe that the State Department would oppose export restrictions on any commodities in the event there actually was a shortage.

Steel Exports in August Advance To 185,183 Tons

WASHINGTON—The Commerce Department's Metals and Minerals Division reported this week that exports of iron and steel products during August aggregated 185,183 gross tons valued at $13,282,599—the second highest level of the year—representing an increase of 21,584 tons and $1,140,851 in value over July exports. Scrap exports, however, suffered a decline to 291,896 tons from the 350,066 tons reported for July.

Iron and steel exports for July totaled 163,598 tons valued at $12,141,748. In August, 1938, exports amounted to 134,109 tons valued at $8,802,123. Cumulative exports for the first eight months of 1939, totaling 1,272,055 tons and valued at $95,678,644, continue to be substantially smaller in quantity than those of the comparable period last year.

Principal product exported during August in point of tonnage was tin plate, with exports of 27,169 tons divided this way: Brazil, 4040 tons; Netherlands, 3878 tons; Canada, 2594 tons; Spain, 1916 tons. Exports of non-alloy black sheet totaled 26,426 tons of which 5,286 tons went to Canada; 4540 tons to the United Kingdom; 2454 tons to Netherlands Indies; and 2077 tons to Sweden. Shipments of non-alloy "other" plates totaled 19, 371 tons, of which 7691 went to Sweden; 2657 to the Netherlands; and 1275 to Canada.

The 291,896 tons of scrap exported during August compared with 108,013 tons shipped in August, 1938.

Prices Show Industry Acts in Public Interest—Desvernine

REAFFIRMATION of third quarter prices for the fourth quarter by the steel industry is a striking illustration of industry's determination "to contribute to stability in the public interest and not profit in its own interest," Raould E. Desvernine, president, Crucible Steel Co. of America, said this week.

The extension of third quarter prices, Mr. Desvernine said in an address delivered Monday before the annual convention of the Farm Equipment Institute at French Lick Springs, Ind., was announced despite the violent rise in prices of essential raw materials. Inventories of basic raw materials are "thus being consumed at irreplaceable low levels whereas an inventory profit could have been taken by an immediate advance" in steel prices, Mr. Desvernine said.

At the same time, said the Crucible Steel executive, effects of the Government entering the market as a competitive purchaser of such strategic war materials as manganese, rubber, tin, tungsten and chromium is already being noticed. "The Federal Government," he said, "is implemented with powerful potentialities to manipulate our domestic economy and the exercise of these manipulative powers will receive greater popular approval when they are used under the claim of being necessary to preserve neutrality and assure peace."

Claims that business men want war for profits are the "most irrational and purely malicious accusations which could be made," he said. "There is and can be no profit in war. To read the balance sheet of our national economy giving effect to the liquidation of the last war is to give the lie to the accusation that war is commercially profitable and beneficial."

. . . OBITUARY . . .

CREIGHTON M. KONKLE, comptroller for the Tennessee Coal, Iron & Railroad Co., Birmingham, died Sept. 24, aged 62 years. Mr. Konkle had been with various subsidiaries of the U. S. Steel Corp. since 1901. He joined the Tennessee company in 1932 as auditor.

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JOHN E. KREPS, former vice-president of the Bourne-Fuller Co., now a division of Republic Steel Corp., died Sept. 29 at his home in Cleveland after a week's illness. He was graduated from Massachusetts Institute of Technology in 1887. In 1899 he became superintendent of the Union Rolling Mill Co. Following absorption of Bourne-Fuller by Republic, he was employed by Republic at Cleveland in the main office until his retirement seven months ago. He was 75 years old.

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HERBERT J. SEWELL, 54 years old, president of the Sewell Cushion Wheel Co. and the Sewell Mfg. Co. of Detroit, died Sept. 4 in his farm home in Washington, Mich., where he had lived since 1920.

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JERRY J. LADUCER, a machinery salesman employed by Pratt & Whitney Co. in its Detroit office, died Sept. 28. Mr. LaDucer was born in Cohoes, N. Y., 53 years ago and had lived in Detroit 14 years.

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THOMAS LOURIM, for 20 years superintendent of Union Steam Pump Co. foundry, died Oct. 1 at Battle Creek, Mich. He was 70 years old.

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HARRY LINDBERG, prominent in the automotive industry for many years, died Sept. 30 at Detroit. Mr. Lindberg was born in Sheffield, Pa., Nov. 26, 1880, and went to Detroit about 1907. For several years he was production manager for the Cadillac Motor Car Co. and later was plant manager for the Fisher Body Corp. at St. Louis. More recently he had been sales engineer for the Motor Products Corp.

PLAY BALL—Enlarging Crosley Field, home grounds of the Cincinnati Reds in time for the World Series without interruption to play was made possible by arc welding. Shown below are new grandstands in which all seating decks, steps, runways, platforms were joined by arc welding. The steel supplier—Virginia Bridge Co. Erectors—J. F. Harig Co., Cincinnati. Welding equipment supplier—Lincoln Electric Co., Cleveland.

Tool Builders Chart Course At Cleveland Convention

CLEVELAND — More than 200 members of the National Machine Tool Builders' Association attended the 38th annual convention of that organization, in Cleveland, Oct. 2 and 3.

An unusual degree of interest marked this meeting in view of the greatly heightened demands upon the industry within the past few weeks and the necessity of charting a safe course in the troubled economic waters.

As Wendell E. Whipp, president of the N.M.T.B.A., pointed out in his opening address on Monday morning, domestic orders for machine tools for the first two weeks of September were twice as large as the total for the entire month of August, not to mention the very substantial increase in foreign orders which likewise materialized during this period.

"With a flood of domestic orders descending upon the machine tool industry, and with machine tool users busy preparing their plants for higher operating schedules, nobody could afford to take 'time out' for the Machine Tool Show," said Mr. Whipp.

Realization of the need to act on delayed replacement of obsolete equipment and not "war business" is responsible, in Mr. Whipp's opinion, for the upturn in domestic demands.

"For years in this country," he said, "machine tool replacement has continued at so slow a rate that it has fallen far behind obsolescence. All of you know how serious has been the need for new machine tools in a vast number of old and established manufacturing enterprises. In addition, almost every venture into new industrial fields these days necessitates the purchase of new machine tools. These are simple and well known facts which are entirely independent of war. Therefore, while war may have supplied the occasion for the current great upswing in machine tool orders in this country, obsolescence and the need for modernization constitute the real reasons."

Advising the industry against the false philosophy of war prosperity, the association's president said:

"We can, it is true, thank the war for having brought home to American manufacturers the realization that we have been well justified in our often-repeated claims as to the urgent need for machine tool replacement and re-equipment. But no one in the machine tool industry believes that in the long run war will bring prosperity.

"Those of us who have been through the last war have some very definite recollections on this subject."

Our Destinies Interwoven With Peace

"The destinies of the American machine tool industry are interwoven with the destinies of America's domestic manufacturing enterprises," said Mr. Whipp. "Our great, lasting, and permanent market lies here in this country. It may be very tempting to take the fullest possible advantage of a sudden war-created foreign demand —but if that demand is fulfilled at the expense of American industry, the price that inevitably must be paid will be a heavy one.

E. T. WEIR, president of the American Iron and Steel Institute, will speak on "Profits or Profiteering" over the WJZ-NBC blue network at 8:45 p.m., Friday, Oct. 6.

"We have been through this very experience not so many years ago. We have seen the whole cycle—war hysteria, war profits, war loans—and then the inevitable reckoning which came after. We got the answer to our participation in the last war in the great depression which began in 1929 and from which we have not—even now—completely emerged.

"The social and economic function of the machine tool industry," said Mr. Whipp, is to raise the standard of living by helping to cut the cost and improve the quality of the devices and conveniences by and with which people live. As long as we keep this premise clearly before us, we can steer a safe course through the troubled times that lie ahead."

Sustained Foreign Demand Likely

A sustained foreign demand is likely, said Tell Berna, reporting as general manager of the association, since nations which have been buying German machine tools will now turn to us. Germany exported $42 millions worth of machine tools in the first six months of this year.

The important problem of terms of payment for exported tools was dealt with informatively by Mr. Berna.

"To exact cash with order," said Mr. Berna, "means that the dealer abroad, in many cases a dealer of long standing, who usually enjoys terms of 60 to 90 days net, must send his money to this country to lie here during the period the machine is being built. With the present volume of business this ties up a large amount of money and imposes a real hardship.

"Most of our members incline to terms of f.o.b. cars at factory, freight prepaid to port of shipment, payment at a New York bank on sight draft attached to inland bill of lading. If the foreign dealer has a line of credit at his bank he can secure the issuance of a letter of credit from that bank without actually tying up his funds. That is transmitted to an American bank, but it will be noted that only the foreign bank is responsible unless the dealer takes one additional step and has the New York bank *confirm* the letter of credit. Unless this is done the American bank is merely transmitting information without indorsement. Unless it is confirmed, the document should bear the words *Advice of Credit and without recourse* or the equivalent. Stoppage of funds from abroad would prevent payment. The credit in the bank abroad may still be 'irrevocable' but that doesn't do the American machine tool builder any good.

"If confirmed by the American bank, payment will be made by that bank on receipt of the inland bill of lading. If it is issued as irrevocable by the American bank and confirmed by them as well, the shipper is as secure as possible. But all of these documents are subject to one qualification; there is always a date of expiration, and inland bill of lading and sight draft must be presented at the American bank on or before that date.

"There has been confusion between an irrevocable letter of credit and an *Authority to Purchase.* Under an authority to purchase the New York bank acts as an agent for a foreign bank. If such authorization is withdrawn by the foreign bank the New York bank will not pay. If such payment has been made and the foreign bank will not or cannot pay, the American bank has recourse to the machine tool builder for recovery of its money. This confusion is increased because an *Authorization to Pay* or an *Advise of Credit* and an *Irrevocable*

Letter of Credit may all look alike on casual inspection."

"Thumbs Down on War," Says Holliday

Guest speaker at the Monday session was W. T. Holliday, president, Standard Oil Co. of Ohio.

"Industry does not want war," said Mr. Holliday. "Practically no one in this country wants war. But industry seems to be going beyond that mere negation. It seems to be becoming belligerent in the expression of an affirmative determination to do everything possible to keep us out of this war. Businessmen seem to be presented with an opportunity for public leadership which they never have had before, and they seem to be embracing that opportunity. If they accept and hold to that leadership they will have practically every woman in this country behind them, and that should prove an irresistible force.

"For one thing, the false myth that business can make a profit out of war is fast disappearing. Businessmen, however, should constantly and publicly continue to point out that war is destructive, and that nothing but loss and misery can come from destruction. The history of the last 25 years should prove to everyone that any temporary profits in war would promptly be washed out by taxation, and that its inevitable economic result is years and years of world depression and chaos."

Another reason why we should keep out of war, said Mr. Holliday, was that the moment we entered the war we would become, of necessity, the very kind of totalitarian state which we say this war against Germany is aimed to destroy.

At the Tuesday morning session, W. P. Kirk, sales manager of the Pratt & Whitney division of Niles-Bement-Pond Co., told "How the Sales Department Can Help." Present-day developments have made the salesman's job more important than ever as the contact man between the user and the maker of machine tools, said Mr. Kirk, and particularly, since the postponing of the machine tool show, which was to be a "grand exposition" of modernization, the responsibility of expounding improvements since the last show will rest upon the salesman.

George A. Bryant, Jr., executive vice-president, the Austin Co., Cleveland, which had much to do with building Russian industrial plants, spoke of "Europe in September," and particularly of conditions in the Soviet. A. E. Johnson, vice-president, Sundstrand Machine Tool Co., Rockford, Ill., and H. B. Kraut, president and general manager of Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., also described their impressions while recently in Europe. All agreed that the great majority of people in all countries did not want or expect war.

H. W. Dunbar, vice-president, Norton Co., Worcester, related his interesting experiences in Japan and Manchukuo, which he recently visited.

John E. Lovely, vice-president, Jones & Lamson Machine Co., Springfield, Vt., was elected president of the National Machine Tool Builders Association for the ensuing year. Other officers elected were: Frederick V. Geier, president, Cincinnati Milling Machine Co., Cincinnati, first vice-president; Clifford S. Stilwell, executive vice-president, Warner & Swasey Co., Cleveland, second vice-president; Wendell E. Whipp, president and general manager, Monarch Machine Tool Co., Sidney Ohio, treasurer. New directors elected were: C. S. Stilwell, executive vice-president, Warner & Swasey Co., Cleveland; H. B. Kraut, president and general manager, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., and E. C. Bullard, vice-president, Bullard Co., Bridgeport, Conn.

A resolution was adopted declaring the association opposed to war and in favor of maintaining an honorable peace in the United States.

U. S. Steel Corp. Weighs Plan to Construct Steel Plant in Brazil

UNITED STATES STEEL CORP. and the Brazilian Government are exploring the possibilities of developing the South American Republic's large iron ore resources in the state of Minas Geraes and of establishing in Brazil an integrated steel plant to manufacture rails and light steel products for use in various South American countries.

A group of U. S. Steel representatives, headed by Heman Greenwood, vice-president of United States Steel Products Co., and a mission appointed by the Brazilian Government have been investigating the Brazilian ore situation and are expected to make a report to Getulio Vargas, president of Brazil, about Nov. 1.

Cost Estimated at $30,000,000

The project, which would cost around $30,000,000, would be financed by the combined efforts of the Brazilian Government and American and Brazilian capital. It involves the improvement of the Central do Brazil, a Government-owned railroad, the erection of a blast furnace, open hearths and rolling mills, a guarantee by the Brazilian Government against future expropriation of the properties, the obtaining of cheap coal and other problems now being studied by the U. S. Steel representatives.

Assayers, surveyors, geologists and railroad experts from the United States for several months have studied possibilities of the creation of a Brazilian steel industry to develop the Minaes Geraes ore deposits, long a source of political controversy. Twenty years ago the Itabira Iron Co., headed by Percival Farquhar, obtained exploitation rights from Epitacao Pessoa, then president of Brazil, over opposition of Arturo Bernardes, a strong political figure in Brazil and once its president. The Itabira company's development grant was canceled recently by President Vargas.

A major obstacle to be overcome in establishing of a Brazilian steel industry is lack of coal near the seaboard.

A report made public by the Commerce Department at Washington this week said that the inadequancy of rolling stock and a shortage of coal were forcing railroads in Brazil to cancel a large number of regularly scheduled trains but that the Brazilian Minister of Communications and Public Works had obtained a special credit of $500,000 for rehabilitating the rolling stock.

In New York United States Steel Corp. officials said that the Brazil project is in the "study stage."

International Harvester Introduces New Tractor

CHICAGO — The International Harvester Co. has introduced a second small farm tractor, the fourth new model to be presented in the last three months. The new tractor, the Farmall-B, along with the little Farmall-A brought out in July, takes the company further into the low price field than ever before, the two selling for $535 and $485, respectively.

September Daily Pig Iron Output Up 11.8 Per Cent

PRODUCTION of coke pig iron in September totaled 2,878,556 gross tons compared with 2,659,813 in August. On a daily basis September showed a gain of 11.8 per cent over that in August, from 85,800 to 95,952 tons in September. The rate of operation last month was 70.4 per cent of the industry's capacity, as compared with 62.9 in August.

There were 169 furnaces in operation on Oct. 1, a gain of 31 over the 138 in blast on Sept. 1. The 169 furnaces were producing iron at the rate of 105,525 tons on Oct. 1 in comparison with 87,715 tons on Sept. 1. The United States Steel Corp. put 14 furnaces in blast, independent producers put in 11 and merchant producers blew in six furnaces.

Furnaces blown in included: two Carrie, one Clairton, two Duquesne, one Ohio, one Mingo, one Farrell, one South Chicago (new) and one South Chicago (old), and two Gary, Carnegie-Illinois Steel Corp.; one Susquehanna, National Steel Corp.; one Bethlehem, and one Cambria, Bethlehem Steel Co.; one Eliza, Jones & Laughlin Steel Corp.; one Monongahela and one Lorain, National Tube Co.; one Haselton and one Pioneer, Republic Steel Corp.; one Campbell, one Jeannette, and one Indiana Harbor, Youngstown Sheet & Tube Co.; one Hamilton, American Rolling Mill Co.; one Perry and one Federal, Interlake Iron Corp.; one Calumet, Wisconsin Steel Co.; one Ford Motor Co. furnace; two North Birmingham furnaces; Sloss-Sheffield Steel & Iron Co., and a Woodward Iron Co. furnace.

No furnaces were blown out or banked.

Production of Coke Pig Iron and Ferromanganese

Gross Tons

	Pig Iron*		Ferromanganese†	
	1939	1938	1939	1938
January	2,175,423	1,429,085	20,805	22,388
February	2,066,187	1,298,268	18,655	20,205
March	2,394,615	1,452,487	16,008	21,194
April	2,056,177	1,376,141	11,518	18,607
May	1,717,516	1,255,024	7,888	13,341
June	2,118,451	1,062,021	16,617	14,546
½ year	12,522,369	7,873,026	91,491	110,281
July	2,356,270	1,201,785	21,213	20,818
August	2,659,813	1,493,995	20,628	6,088
September	2,878,556	1,680,435	21,949	630
October	.....	2,052,284	....	3,621
November	.....	2,269,983	....	13,156
December	.....	2,210,728	....	19,197
Year	.....	18,782,236	....	173,791

*These totals do not include charcoal pig iron.
†Included in pig iron figures.

Daily Average Production of Coke Pig Iron

Gross Tons

	1939	1938	1937	1936	1935
January	70,175	46,100	103,597	65,351	47,656
February	73,578	46,367	107,115	62,886	57,448
March	77,246	46,854	111,596	65,816	57,098
April	68,539	45,871	113,055	80,125	55,449
May	55,404	40,485	114,104	85,432	55,713
June	70,615	35,400	103,584	86,208	51,570
½ year	69,184	43,497	108,876	74,331	54,138
July	76,009	38,767	112,866	83,686	49,041
August	85,800	48,193	116,317	87,475	56,816
September	95,952	56,015	113,679	91,010	59,216
October	....	66,203	93,311	96,512	63,820
November	....	75,666	66,891	98,246	68,864
December	....	71,314	48,075	100,485	67,950
Year	....	51,458	100,305	83,658	67,556

Merchant Iron Made, Daily Rate

Tons

	1939	1938	1937	1936	1935
January	10,603	10,635	16,106	10,537	3,926
February	9,637	8,854	16,514	11,296	6,288
March	8,951	8,524	16,457	10,831	7,089
April	8,508	8,273	14,517	13,897	8,799
May	7,038	6,431	19,483	12,814	8,441
June	7,613	5,375	15,870	14,209	7,874
July	8,396	5,495	19,609	11,619	8,644
August	....	6.614	17,831	12,148	8,194
September	11,293	11,205	20,065	12,526	10,090
October	....	10,799	18,950	13,645	11,199
November	....	13,208	15.662	14,739	12,503
December	....	9.130	10,964	14,852	13,312

Production by Districts and Coke Furnaces in Blast

FURNACES	Production (Gross Tons) September (30 Days)	Production (Gross Tons) August (31 Days)	October 1 Number in Blast	October 1 Operating Rate, Tons a Day	September 1 Number in Blast	September 1 Operating Rate, Tons a Day
New York:						
Buffalo	201,462	190,669	10	6,915	9	6,150
Other New York and Mass.	14,338	15,771	1	480	1	510
Pennsylvania:						
Lehigh Valley	59,311	56,051	5	2,335	4	1,810
Spiegeleisen	4,292	4,115	1	145	1	135
Schuylkill Valley	27,813	25,468	2	925	2	820
Susquehanna and Lebanon Valleys	12,190	12,979	1	405	1	420
Pittsburgh District	609,102	541,045	33	23,070	26	18,780
Ferro. and Spiegel	6,902	5,269	1	230	1	170
Shenango Valley	26,370	14,738	2	1,150	1	475
Western Pennsylvania	76,141	58,170	6	2,845	4	2,005
Ferro. and Spiegel	12,616	8,853	1	420	1	285
Maryland	170,348	164,985	6	5,680	6	5,320
Wheeling District	135,068	132,746	7	4,525	6	4,280
Ohio:						
Mahoning Valley	290,615	289,128	17	11,550	13	9,135
Central and Northern	278,324	277,437	15	9,330	14	8,950
Southern	45,582	36,570	5	1,670	4	1,180
Illinois and Indiana	527,949	486,759	26	20,280	19	15,800
Michigan and Minnesota	97,117	65,630	6	3,255	5	2,810
Colorado, Missouri and Utah	33,671	44,103	3	1,380	3	1,425
The South:						
Virginia	.....	.....	0	....	0	....
Ferromanganese	2,760	2,754	1	95	1	90
Kentucky	26,593	25,586	2	885	2	825
Alabama	217,225	194,606	17	7,865	13	6,135
Ferro. and Spiegel	2,767	6,381	1	90	1	205
Tennessee	.....	.....	0	....	0	....
Total	2,878,556	2,659,813	169	105,525	138	87,715

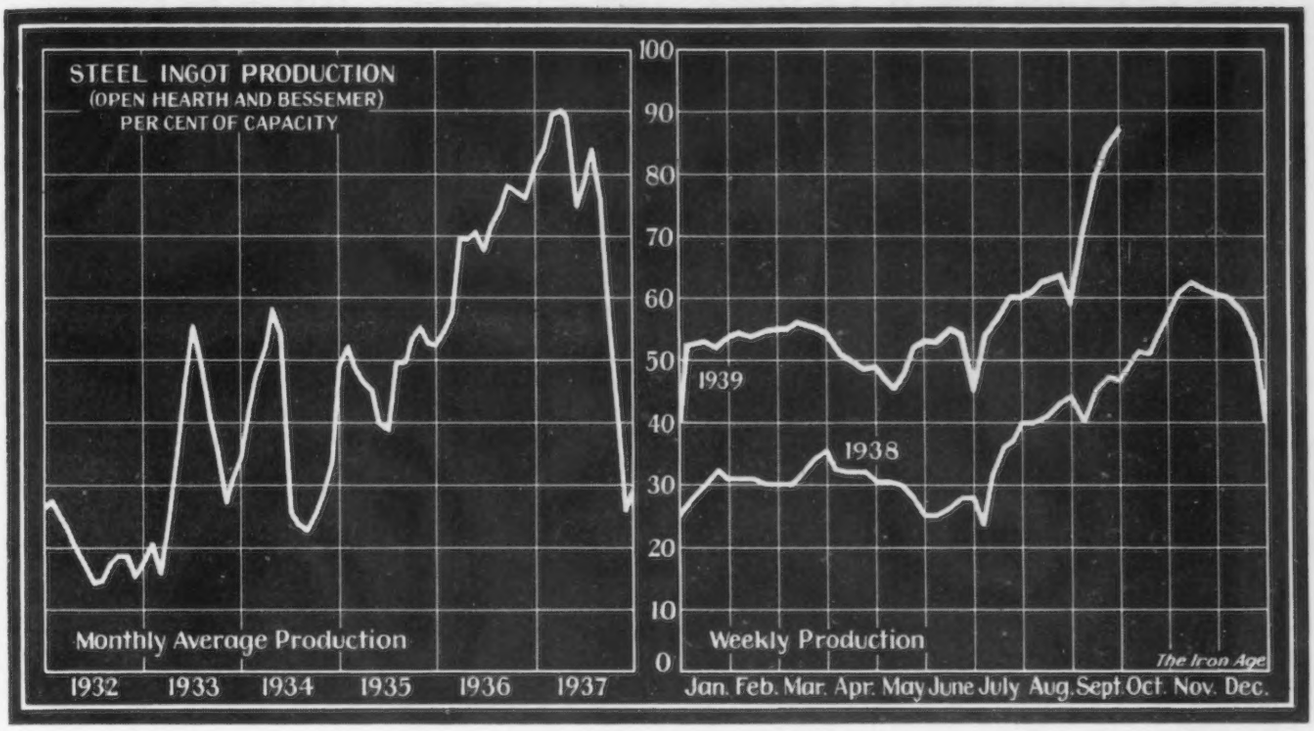
Strike Voted by CIO at Midland Steel Products

CLEVELAND—Midland Steel Products Co., large manufacturers of automobile frames, was threatened with a work stoppage here Tuesday, the result of a controversy with the CIO-United Automobile Workers Union.

A. E. Stevenson, union spokesman, said a slowdown had been in effect for several days and that a strike had been voted following the collapse of contract negotiations. He claimed less than half of the 1100 workers entered the plant Tuesday, but company officials declined comment. Federal conciliators have been working on the case.

In addition to an exclusive contract the union asks higher piece work rates and paid vacations. The company makes frames for Buick, Hudson, Pontiac and Studebaker, among other automotive producers.

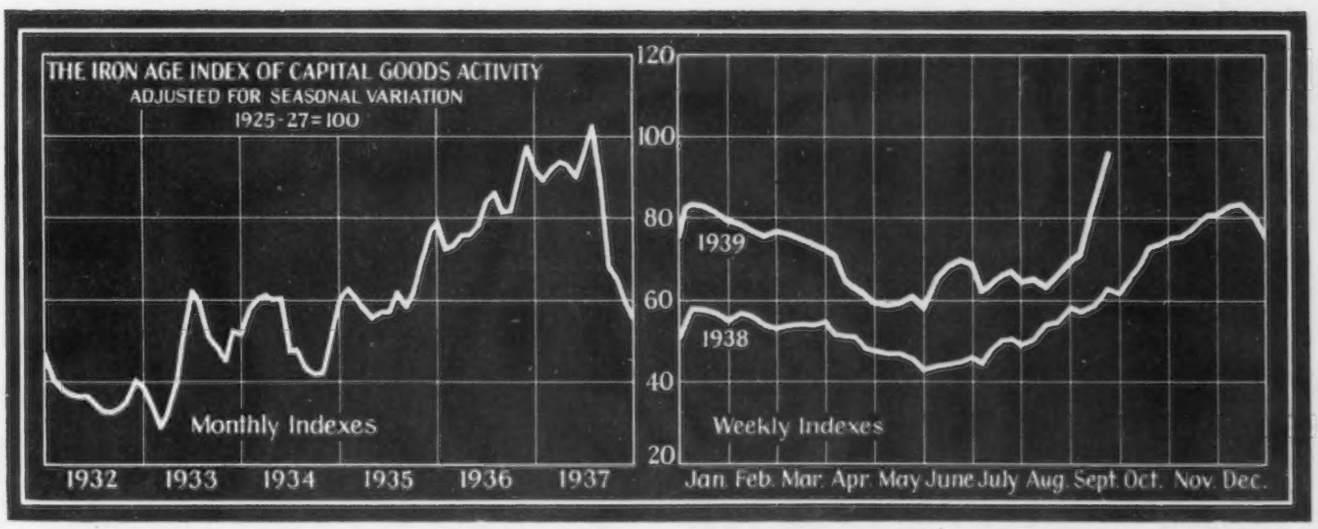
Ingot Rate at 87½% But Rate of Climb Slowing Up



District Ingot Production, Per Cent of Capacity	Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	Western	St. Louis	East-ern	Aggre-gate
CURRENT WEEK..	84.0	86.0	93.0	72.0	88.0	78.5	90.0	97.0	86.0	83.5	60.0	75.0	95.0	**87.5**
PREVIOUS WEEK..	80.0	84.0	89.0	65.0	86.0	73.5	90.0	97.0	86.0	79.0	60.0	75.0*	95.0	**84.0**

*Corrected.

Index Reaches 95.9, Peak Since Week of Sept. 11, 1937



ADVANCES in all components pushed THE IRON AGE index of capital goods activity up 7.9 points to 95.9 in the past week, the highest combined index recorded since the week of Sept. 11,1937, and the sixth consecutive weekly gain from 63.2 in the week of Aug. 19. The high point of activity in 1937 was reached in the week of Aug. 14, when the index touched 106. In the past week, as has been the rule all during the present upsurge, the automobile and steel factors were the heaviest contributors to the week's advance. Both these components passed the comparative 1929 position for the first time since 1937. In 1929, the index reached a high of 130 in the early spring. This was followed by a small decline during the early summer months and an advance to 129.5 in mid-August. From that point onward the general trend of the index was downward until the low point was reached in the middle of 1932.

	Week Ended Sept. 30	Week Ended Sept. 23	Comparable Week 1938	Comparable Week 1929
Steel ingot production[1]	120.6	114.7	64.0	118.8
Automobile production[2]	129.7	101.8	54.6	114.6
Construction contracts[3]	69.5	69.1	74.6	110.1
Forest products carloadings[4]	63.8	62.8	57.4	114.2
Production and shipments, Pittsburgh District[5]	96.2	91.8	58.3	119.5
Combined index	**95.9**	**88.0**	**61.8**	**115.4**

Sources: 1. THE IRON AGE; 2. Ward's Automotive Reports; 3. *Engineering News-Record*; 4. Association of American Railroads; 5. University of Pittsburgh.

. . . SUMMARY OF THE WEEK . . .

. . . September rise in production unprecedented for rapidity.

° ° °

. . . Pig iron output up and 31 additional furnaces in blast.

° ° °

. . . Steel scrap rises to highest average in 16 years.

WITH steel production this week at 87½ per cent, a gain of 24 points over the rate of 63½ per cent in effect in the last week of August, the steel industry has experienced the most rapid advance in its history. In the period from March through July, 1933, there was a gain of 253 per cent, but the gain of the past few weeks is unprecedented within so short a period. Closely approaching it, however, was the 1938 production rise, which averaged nearly 24 per cent per month from June to November.

Steel production has climbed much more rapidly than pig iron production. Figures for September show a total pig iron output of 2,878,556 gross tons compared with 2,659,813 tons in August, which on a daily basis of 95,952 tons last month was 11.8 per cent over the daily rate of 85,800 tons in August. More significant, however, is the fact that 169 out of 239 available furnaces were in blast on Oct. 1, a gain of 31 over the 138 that were in blast on Sept. 1, a rate of 77½ per cent of capacity. Last month's production represented 70.4 per cent against 62.9 per cent in August. U. S. Steel subsidiaries added 14 furnaces during the month, independent companies 11 and six merchant furnaces went in. The Carnegie-Illinois Steel Corp. will put on two additional furnaces this week in the Pittsburgh district, and other furnaces are scheduled to be placed in service within a week or two.

WITH all of the major steel companies virtually sold out for the remainder of the year on principal products, excepting in pipe, rails and a few specialties, efforts are being concentrated on production and delivery problems.

Meanwhile, many consumers who have been unable to obtain all of the steel they want for fourth quarter delivery are asking for reservations on first quarter schedules. Unwilling at first to accept business for that delivery until prices had been determined, nearly all steel companies have been forced by the insistent pressure of their customers to do so.

Pressure from steel buyers for an early announcement of first quarter prices is also increasing. While no definite word is obtainable as to when this announcement may be expected, there are indications it may come within a week and certainly before the end of the month. The remote possibility of early peace in Europe might be a cause for delay. An advance in prices of steel and pig iron is clearly indicated if war continues. Straws which point to the extent of such an advance are the announcements of some of the smaller independent companies. A plate manufacturer in the East and one in Ohio have followed the $5 a ton rise on this product initiated by two eastern makers last week. Makers of field and lawn fence have advanced prices $3 a ton, and an Illinois maker of barbed wire has put up the price of that product a like amount. Welded wire building fabric has also gone up $3 a ton. Makers of new billet steel reinforcing bars are disinclined to sell at prevailing prices and some premium quotations are being obtained, pointing to the possibility of a general price advance of about $5 a ton.

Steel exporters have advanced prices and are closely restricting sales owing to the sold-up condition of the mills. In some instances export quotations are well above domestic prices. For example, quotations on barbed wire have ranged from $6 to $17 a ton above domestic prices and sales have been made at a $13 premium. General quotations are 2.45c. a lb. F. A. S. for shapes and plates, 2.55c. for merchant bars, 2.35c. for reinforcing bars, 3.40c. for hot rolled sheets, and 3.60c. for cold rolled sheets.

The continued advance in raw material costs is embarrassing those companies which are not well protected with supplies purchased prior to the outbreak of war. An advance of $40 a ton in zinc prices within two months has greatly increased the cost of making galvanized sheets. A more important element of general cost, however, is scrap, which has risen again this week in virtually all markets, being up $1 a ton in Pittsburgh and Chicago, 50c. in Philadelphia and $1.50 at Cleveland and Youngstown. THE IRON AGE scrap composite price, rising this week to $22.50, is at its highest level since April, 1923. The irony of the scrap situation for some steel companies is that they have paid or will pay for bundled sheet scrap within $7 or $8 a ton of the prices they are obtaining for sheets and strip now being shipped against last May's commitments. Moreover, the top price for No. 1 heavy melting steel at Pittsburgh, $24.50, is $2 a ton above the selling price there of basic pig iron.

COMPLICATING the situation for the steel companies is the strong buying movement among the railroads, which are demanding early delivery of steel so that they can get started on equipment programs. Railroad business that has been placed or is definitely in sight will take about 1,000,000 tons of steel, a considerable part of which is being pressed on the mills for delivery this year.

Automobile companies are also pressing for steel shipments as their assemblies rise rapidly, despite the strike difficulties with which the industry is beset.

General buying of steel has, of course, lessened considerably because of the unwillingness of producers to book more business.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Oct. 3, 1939	Sept. 26, 1939	Sept. 5, 1939	Oct. 4, *1938
Rails, heavy, at mill	$40.00	$40.00	$40.00	$40.00
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	40.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point.	34.00	34.00	34.00	34.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	34.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	40.00
Wire rods: Nos. 4 and 5, Pittsburgh, Chicago, Cleveland	43.00	43.00	43.00	43.00
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	1.90

Finished Steel

Cents Per Lb.:	Oct. 3, 1939	Sept. 26, 1939	Sept. 5, 1939	Oct. 4, *1938
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15	2.15	2.15	2.25
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.10
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.10
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.65	2.65	2.65	2.70
Alloy bars: Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton	2.70	2.70	2.70	2.80
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.00	2.00	2.00	2.15
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.80	2.80	2.80	2.95
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham.	3.50	3.50	3.50	3.50
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	2.00	2.00	2.00	2.15
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown	3.05	3.05	3.05	3.20
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham	2.40	2.40	2.40	2.45
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.60
Barbed wire, galv.: Pittsburgh, Chicago, Cleveland, Birmingham	†3.25	3.25	3.25	3.20
Tin plate, 100 lb. base box: Pittsburgh and Gary	$5.00	$5.00	$5.00	‡$5.35

*Pittsburgh prices only.
†Applies to 80-rod spools only.
‡Subject to post-season adjustment.

Pig Iron

Per Gross Ton:	Oct. 3, 1939	Sept. 26, 1939	Sept. 5, 1939	Oct. 4, *1938
No. 2 fdy., Philadelphia	$24.84	$24.84	$22.84	$21.84
No. 2, Valley furnace	23.00	23.00	21.00	21.00
No. 2, Southern Cin'ti	23.06	23.06	21.06	21.06
No. 2, Birmingham	19.38	19.38	17.38	17.38
No. 2, foundry, Chicago†	23.00	23.00	21.00	21.00
Basic, del'd eastern Pa.	24.34	24.34	22.34	21.34
Basic, Valley furnace	22.50	22.50	20.50	20.50
Malleable, Chicago†	23.00	23.00	21.00	21.00
Malleable, Valley	23.00	23.00	21.00	21.00
L. S. charcoal, Chicago	30.34	30.34	28.34	28.34
Ferromanganese, seab'd carlots	100.00	100.00	80.00	92.50

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:	Oct. 3, 1939	Sept. 26, 1939	Sept. 5, 1939	Oct. 4, *1938
Heavy melting steel, P'gh	$23.25	$23.25	$16.25	$15.25
Heavy melting steel, Phila.	**23.00**	22.50	16.75	14.75
Heavy melting steel, Ch'go.	**20.25**	19.25	13.875	12.75
Carwheels, Chicago	**18.50**	17.75	12.75	13.25
Carwheels, Philadelphia	**22.25**	20.50	16.25	16.75
No. 1 cast, Pittsburgh	**24.25**	23.25	16.00	15.50
No. 1 cast, Philadelphia	**24.75**	22.50	16.75	16.75
No. 1 cast, Ch'go (net ton)	17.75	17.75	12.75	12.25

Coke, Connellsville

Per Net Ton at Oven:	Oct. 3, 1939	Sept. 26, 1939	Sept. 5, 1939	Oct. 4, *1938
Furnace coke, prompt	$4.75	$4.75	$3.75	$3.75
Foundry coke, prompt	5.50	5.50	4.75	4.75

Non-Ferrous Metals

Cents per Lb. to Large Buyers:	Oct. 3, 1939	Sept. 26, 1939	Sept. 5, 1939	Oct. 4, *1938
Copper, Electrolytic, Conn.	12.00	12.00	12.50	10.375
Copper, Lake, New York	12.125	12.125	12.50	10.50
Tin (Straits), New York	60.00**	70.00	59.00	43.625
Zinc, East St. Louis	**6.50**	6.25	5.75	4.95
Zinc, New York	**6.89**	6.64	6.14	5.34
Lead, St. Louis	5.35	5.35	5.10	4.95
Lead, New York	5.50	5.50	5.25	5.10
Antimony (Asiatic), N. Y.	14.00	14.00	14.00	14.00

**Nominal.

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Oct. 3, 1939	2.236c. a Lb.	$22.61 a Gross Ton	$22.50 a Gross Ton
One week ago	2.236	22.61	21.67
One month ago	2.236	20.61	15.62
One year ago	2.286	20.44	14.25

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

	High	Low
1939	2.286c., Jan. 3	2.236c., May 16
1938	2.512c., May 17	2.211c., Oct. 18
1937	2.512c., Mar. 9	2.249c., Jan. 4
1936	2.249c., Dec. 28	2.016c., Mar. 10
1935	2.062c., Oct. 1	2.056c., Jan. 8
1934	2.118c., Apr. 24	1.945c., Jan. 2
1933	1.953c., Oct. 3	1.792c., May 2
1932	1.915c., Sept. 6	1.870c., Mar. 15
1931	1.981c., Jan. 13	1.883c., Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9
1929	2.223c., Apr. 2	2.192c., Oct. 29
1928	2.192c., Dec. 11	2.142c., July 10

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

	High	Low
1939	$22.61, Sept. 19	$20.61, Sept. 12
1938	23.25, June 21	19.61, July 6
1937	23.25, Mar. 9	20.25, Feb. 16
1936	19.73, Nov. 24	18.73, Aug. 11
1935	18.84, Nov. 5	17.83, May 14
1934	17.90, May 1	16.90, Jan. 27
1933	16.90, Dec. 5	13.56, Jan. 3
1932	14.81, Jan. 5	13.56, Dec. 6
1931	15.90, Jan. 6	14.79, Dec. 15
1930	18.21, Jan. 7	15.90, Dec. 16
1929	18.71, May 14	18.21, Dec. 17
1928	18.59, Nov. 27	17.04, July 24

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low
1939	$22.50, Oct. 3	$14.08, May 16
1938	15.00, Nov. 22	11.00, June 7
1937	21.92, Mar. 30	12.92, Nov. 10
1936	17.75, Dec. 21	12.67, June 9
1935	13.42, Dec. 10	10.33, Apr. 29
1934	13.00, Mar. 13	9.50, Sept. 25
1933	12.25, Aug. 8	6.75, Jan. 3
1932	8.50, Jan. 12	6.43, July 5
1931	11.33, Jan. 6	8.50, Dec. 29
1930	15.00, Feb. 18	11.25, Dec. 9
1929	17.58, Jan. 29	14.08, Dec. 3
1928	16.50, Dec. 31	13.08, July 9

. . . THIS WEEK'S MARKET NEWS . . .

NEW BUSINESS

. . . Orders decline in volume as mills are filled up

NEW business in the PITTSBURGH district in the past week has been negligible with the exception of some specifications being accepted for cold finished bars and certain tubular products. The small amount of business placed involving other major steel products has been at a price to be in effect at time of shipment.

Orders no longer are swamping CHICAGO mills, volume having been lightened to a considerable extent. Business will be maintained at a fair level for some time to come, however, assuming the continuance of present world conditions. Much of the feverish excitement of last month has worn off. However, at least two order departments in CHICAGO are still a week or more behind in entering orders.

Of great importance to the CHICAGO district as buyers are the railroads, which this week ordered or asked prices for more than 5000 cars and 40,000 tons of rails. Even should war cease abroad, it is considered almost certain that the carriers would leave their orders in and take delivery on much needed rolling stock and track materials.

Deliveries will be a great problem for quite a while, some mills now quoting into January on cold rolled sheets. With the exception of heavy structurals, pipe, some wire products, hot rolled sheets, and a few other items, virtually all finished steel products are sold out for the year. Production schedules here and there leave gaps that can be utilized for certain sizes ahead of time but these are few and far between today.

Steel castings orders in August in the CHICAGO district, including Michigan, were 31½ per cent ahead of July, and shipments topped the previous month by 17.4 per cent. Malleable castings showed a 44 per cent improvement over July in orders booked and 32.8 per cent in tons shipped.

September orders exceeded all expectations of steel sellers at CLEVELAND and YOUNGSTOWN, where mills are now booked solidly until the end of this year. Another period of strenuous buying is likely to occur when books are opened for first quarter business.

Production and shipments are not yet proceeding smoothly but within the next two weeks many mill problems will be adjusted more satisfactorily. Temporary difficulty in obtaining raw steel is felt by all producers, integrated as well as non-integrated, while the splitting up of operating crews to provide experienced men in every shift has created some confusion. On the shipping side, the flow of empty railroad cars and trucks for outbound deliveries is erratic at present. Shipments will not hit their peak for three or four weeks. Some of the mills and auxiliary uits built during the past two years are now for the first time getting into real operation.

Heavy bar covering to avoid the new scale of extras which went into effect on Oct. 1, and a substantial amount of end-of-the-quarter contracting, gave PHILADELPHIA sellers last week one of the best weeks experienced during the current buying move. However, the pressure from miscellaneous consumers has lessened considerably. While most of the smaller producers in eastern Pennsylvania are endeavoring to avoid taking business that may run over into the next quarter, there has been a fairly sizable amount of this type of business booked, particularly by the larger producers.

Pressure on PACIFIC COAST shipments has been somewhat relieved by an indefinite postponement of the threatened dock strike. Machinery, steel plate and structural shape business will receive considerable impetus by the recent award of 19 type C-1 diesel cargo ships to Pacific Coast ship yards by the Maritime Commission.

PRICES

. . . Some independent mills announce increases, effective at once

PRICE developments during the week include the following:

Worth Steel Co., Claymont, Del., followed Lukens Steel Co. and Alan Wood Steel Co. in advancing plate prices $5 a ton and an Ohio mill is quoting $5 higher on plates also.

The Northwestern Steel & Wire Co., Sterling, Ill., advanced prices of Nos. 9 and 11 field fence and galvanized barbed wire $3 a ton. Makers of lawn fence and welded wire reinforcing and building fabric also raised prices $3 a ton, effective Oct. 1.

At least one small non-integrated sheet producer has withdrawn from the market, although not entirely sold up for the fourth quarter, and will do no more selling at present published prices.

Steel consumers are still awaiting some information on new steel prices to be quoted by the major companies. The most definite information obtainable is that announcements may come before the end of this month. The remote possibility that the European war might end suddenly is one cause for a delay, as mills do not want to fill up with tonnage which would certainly be cancelled if war should end.

Concrete bar manufacturers are disinterested in orders for that product at present published prices. Premium prices are being obtained by some mills. There is a possibility that concrete bar prices may be placed on a parity with merchant bar prices. In CHICAGO mills have obtained 2c. a lb. or more.

An increasing number of mills are taking orders for the first quarter at price in effect at time of shipment to govern.

PIG IRON

. . . All available furnaces being rushed into blast

RISING scrap prices, with the consequent tightening of available supplies, have forced many melters to revise their estimated consumption of pig iron, resulting in a fair amount of pig iron buying. Shipments continue to grow heavier in most districts. For example, in the Chicago district September shipments were about double those of the previous month, while in one instance an increase of 150 per cent is reported.

Production of merchant and steel making iron continues to climb steadily as monthly blast furnace statistics for September, published elsewhere in this issue, will show. Steel mills are especially short of iron and are rushing all available equipment into blast as quickly as possible. By the end of this week 36 or 37 furnaces out of a total of 50 in the immediate Pittsburgh district will be in blast. Carnegie-Illinois is putting on one furnace this week at the Duquesne works and one at the Isabella works. The Pittsburgh Coke & Iron Co. will

soon put its second merchant furnace in blast at Sharpsville, Pa., while the Pittsburgh Steel Co. is expected to blow in its remaining furnace this week or early next week. All 18 furnaces in the Birmingham district are in operation. The Interlake Iron Corp. has four of its five Chicago furnaces in blast while seven of the nine available at all of its properties are in blast.

A fairly large volume of export inquiries continues, but some furnaces are not willing to quote even at the $1 a ton premium over domestic prices now generally ruling in the export market. Inquiries from South America have been added to those from Scandinavian countries.

While there is some talk in the trade of a further price advance on pig iron, no definite information on this subject is yet available.

STEEL OPERATIONS

. . . Rate for industry 87 per cent. up 24 points over last week of August

AT an estimated rate of 87½ per cent this week, the steel industry is operating at an average of 24 points above the rate of the last week of August—a climb so rapid as to be unprecedented.

Ingot output at PITTSBURGH is up four points this week to 84 per cent, but the maximum rate to be made during the present upswing has not yet been reached. For four weeks in April, 1937, the Pittsburgh rate was maintained at 94 per cent of capacity and there is a possibility that the current rush to produce steel may take the ingot output figure close to the 1937 high. The WHEELING-WEIRTON rate remains unchanged at 90 per cent.

CHICAGO district mills are operating at 86 per cent of capacity, up two points from last week and equal to the high of 1937.

The rate for YOUNGSTOWN and nearby cities this week is up four points to 93 per cent, while the CLEVELAND-LORAIN average is up two points to 88 per cent. In both districts certain plants have now reached the limit of output and any further fluctuations in their schedules will be downward owing to inabilty to keep open-hearth furnaces at such a high rate of operaton without repairs.

The steel-making rate for the BUFFALO district forged upward again this week to 77 per cent with the addition of two hearths at Bethlehem's Lackawanna plant, 24 furnaces now being active there, seven at Republic, and two at Wickwire-Spencer.

A further advance in steel production in the SOUTHERN OHIO district is recorded this current week, with the average up a trifle over two points to 79 per cent of capacity.

Steel making operations in EASTERN PENNSYLVANIA are estimated at 72 per cent of capacity.

Nineteen open hearths operated last week at Birmingham; 20 are scheduled this week. The increase is at Ensley.

The hot mills and the tin house at the Shenango plant of Carnegie-Illinois Steel Corp., New Castle, Pa., started operation this week after being idle since July. Forty mills will work at least 16 turns per week, contrasted with 30 mills on nine turns just before the shutdown last summer. The shearing, pickling, annealing and sorting rooms will start work within a few days. The plant is the largest hand mill in the country.

Carnegie-Illinois will this week increase the number of active blast furnaces to 28 in the Pittsburgh district with addition of No. 6 furnace at the Duquesne, Pa., works and Isabella No. 3 at Etna, Pa. With the additional two furnaces, Carnegie-Illinois will have 20 active blast furnaces in Allegheny County.

RAILROAD BUYING

. . . Requirements of carriers may take 1,000,000 tons of steel

IT is estimated that steel requirements for the recent substantial number of car building and rail laying programs will run well over 1,000,000 tons. Car orders placed, those now in the inquiry stage, and those cars being repaired in railroad shops will take between 600,000 and 700,000 tons of steel it is estimated. Actual rail business placed or about to be placed, not including the 100,000-ton Union Pacific program, runs from between 350,000 and 400,000 tons.

Besides the large domestic program, foreign orders will be substantial. An Associated Press dispatch from Lisbon states that Portugal will buy about $5,000,000 worth of railroad equipment here through Charles B. McDaniel, Jr., of Atlanta, Ga., now a resident of Paris, whose business corporation will be the Portugal-American Corp., with offices probably in Washington and NEW YORK. The Argentine State Railways has announced the purchase of $500,000 worth of tank cars in the United States. Brazilian and Chilean purchases also will be considerable.

Equipment Orders and Inquiries

Illinois Central Railroad has ordered 2500 freight cars distributed as follows: 750 hopper cars to Pullman Standard Car Mfg. Co.; 750 gondola cars to General American Car Transportation Co.; 500 box cars to Mt. Vernon Car Mfg. Co.; and 500 box cars to American Car & Foundry Co. Estimated steel required is 30,000 tons.

In addition to the 300 box cars purchased by Chicago & North Western from Mount Vernon Car Co. as reported last week, this road has placed 500 box cars with Pullman Standard Car Mfg. Co.

In addition to the 2000 freight cars recently reported as purchased by Norfolk & Western, this road has placed new business involving 1500 cars divided equally among Ralston Steel Car Co., Virginia Bridge Co. and Bethlehem Steel Co., making a total purchase of 3500 hopper cars.

Lehigh & New England Railroad will open bids on Oct. 6 for 100 70-ton covered hopper cars, requiring about 1500 tons of steel.

Seaboard Airline, on Oct. 9, will open bids for 1000 50-ton box cars, 100 70-ton hopper cars, and 150 50-ton flat cars. These 1250 cars will require approximately 15,000 tons of steel.

New York, New Haven & Hartford, on Oct. 30, will open bids for 1000 box cars taking approximately 10,000 tons of steel.

Great Northern, on Oct. 10, will open bids for from 500 to 1500 75-ton ore cars, with steel requirements ranging from 10,000 to 30,000 tons.

Atchison, Topeka & Santa Fe may soon inquire for 4500 freight cars.

Delaware, Lackawanna & Western will open bids shortly on 1100 freight cars and it is believed the road will soon be in the market for 1700 additional cars.

Brazilian Railroad interest recently purchased 500 freight cars from American Car & Foundry Co. and 500 from Pullman Standard Car Mfg. Co.

The Milwaukee will build 2000 lightweight steel 50-ton box cars in its shops at Milwaukee, and will buy 10 4-8-4 freight locomotives from the Baldwin Locomotive Works. Estimated cost of entire program, including 30,000 tons of rails, $10,000,000.

The Burlington is inquiring for 10 4-8-4 freight engines, four diesel locomotives, 100 flat cars and 250 hopper cars.

Pennsylvania Railroad will remodel 85 all-steel coaches.

Norfolk & Western will build 10 locomotives in its own shops.

Boston & Maine has purchased an additional locomotive from Baldwin Locomotive Works, making a total of three purchased within past 30 days.

Other pending purchases include 100 flat cars for Chicago Great Western; 100 hopper cars for Chicago & Illinois Midland, and 500 to 800 box cars for Louisiana & Arkansas.

Rails and Accessories

Southern Pacific has placed 60,000 tons of rails approximately as follows: 21,000 tons to Columbia Steel Co.; 21,000 tons to Bethlehem Steel Co.; 18,000 tons to Colorado Fuel & Iron Corp. About 15,000 tons of track materials will be placed soon.

The New York, New Haven & Hartford has been authorized to buy 15,000 tons of rails.

Illinois Central Railroad has purchased 10,600 tons of rails, divided as follows: 3300 tons from Carnegie-Illinois Steel Corp.; 3300 tons from Inland Steel Co., and 4000 from Tennessee Coal, Iron & Railroad Co.

Norfolk & Western Railroad has purchased 25,000 tons of rails distributed as follows: 18,750 tons to Carnegie-Illinois Steel Corp.; 6250 tons to Bethlehem Steel Co.

Spokane, Portland & Seattle Railroad has ordered 10,000 tons of rails from Colorado Fuel & Iron Corp.

Northern Pacific Railroad has placed orders for 35,000 tons of rails distributed approximately as follows: Colorado Fuel & Iron Corp., 600 tons; Inland Steel Co., 1400 tons; Carnegie-Illinois Steel Corp., 23,000 tons; Bethlehem Steel Co., 10,000 tons.

Nashville, Chattanooga & St. Louis Railway has placed an order for 2400 tons of rail with Tennessee Coal, Iron & Railroad Co.

The Milwaukee road has ordered 22,500 tons of rails from Carnegie-Illinois Steel Corp., and 7500 tons from Inland Steel Co. Necessary track fastenings also were acquired.

The Mobile & Ohio has been authorized by the Federal Court to spend $145,000 for 3000 tons of 90 lb. rails, together with accessories.

The St. Louis-San Francisco has placed 16,750 tons of rails with the Tennessee company.

North Western of Brazil is contemplating purchase of 70,000 tons of rails. This is in addition to 25,000 tons recently purchased.

Pere Marquette road will open bids Nov. 20 on a new car ferry for use on Lake Michigan, the first purchased since 1929 when two were ordered at a cost of approximately $1,250,000 each. Invited to bid are American Shipbuilding Co., Manitowoc Shipbuilding Co., Great Lakes Engineering Works and Toledo Shipbuilding Co. Delivery is requested in 11 months. The twin screw ferry will be 406 feet long and of open hearth steel.

Southern Pacific placed 19,300 tons of rail fastenings for Pacific lines with following: Columbia, Bethlehem, Colorado Fuel & Iron, Rail Joint Co., P & M Co., National Lock Washer Co. and Ramapo Ajax division of American Brake Shoe & Foundry Co. Cost of rail was $2,655,000, of fastenings 1,175,000. Eight Diesel-electric switching locomotives also placed with unnamed firm.

IRON ORE

. . . September shipments largest since same month in 1937

SEPTEMBER shipments of Lake Superior iron ore from upper Lake ports totaled 7,865,007 gross tons, around 900,000 tons in excess of the 6,954,580 tons carried in August, and heaviest of any month since September, 1937, when 9,173,991 tons was carried according to the monthly report of the Lake Superior Iron Ore Association. In September, 1938, shipments from upper Lake ports totaled only 3,284,800 tons.

Cumulative shipments for the season up to Oct. 1 were 30,360,774 tons, an increase of 16,203,484 tons above the 14,157,290 tons carried last season up to Oct. 1.

COLD FINISHED BARS

. . . Makers flooded with orders
. . . Booked solid on some sizes

IN the past two weeks cold finished bar makers have been flooded with orders to the extent that most producers are fairly well booked over the next few months. On some sizes mills are booked through the end of the year, but there is probably some room left on mill schedules, although this is expected to disappear before the next week is out. Demand has come from all classifications.

WAREHOUSE BUSINESS

. . . Galvanized sheets advanced
. . . Order volume increasing

IN CHICAGO, steel warehouses enjoyed a very good September, substantially ahead of the previous month, and perhaps the best month of the year to date. October, however, is expected to exceed September in volume of business. Demand is heavy for nearly all products, and the jammed condition of the mills is reflected noticeably by the business coming in.

Chicago warehouses have advanced galvanized sheet prices to 4.60c. and have increased the quantity extras on cold finished steel, the old base of 1000 lb. and over being raised to 1500 lb. and over. An extra of 10c. is now charged for quantities of 1499 lb. to 1000 lb., which formerly took the base price. Other extras under 1000 lb. are unchanged.

Boston district warehouses have advanced galvanized sheets 25c. per 100 lb. The base price now is 4.86c. a lb. Prices for other sheets and all other steel mill products are unchanged.

Warehouse buying in PHILADELPHIA has improved steadily over the past two weeks with the result that bookings in September show a gain of from 15 to 20 per cent over August. While the lighter products are receiving the heaviest call, sales of shapes and plates are surprisingly heavy. Effective Oct. 2, quotations were increased from $3 to $5 a ton on most items. Prices of cold finished bars, which were not changed, are expected to be revised shortly. A certain amount of confusion has accompanied the increase in buying as most warehouse interests have been operating with very small stocks.

Buying in the NEW YORK-NEW JERSEY area in September was the heaviest since the fall of 1937, with most of the activity centering in the flat rolled products, including both plain and alloy grades. Sales of heavy steels, while showing a slight improvement, did not gain in volume comparable with the lighter items. Prices of certain special coated sheets have been marked higher. A leading seller has issued a new price list on nails which, in addition to showing an increase in prices, also indicates a revision in quantity brackets. The new price for common nails is 3.10c. per lb. for one to nine kegs, as against the previous price of 2.65c. for five or more kegs. The demand for nails has

tapered somewhat, after several weeks of fairly heavy buying. Concessions from published price still exist in certain directions, but are not as severe as in the past.

WIRE PRODUCTS

. . . Barbed wire and some other items advanced $3 a ton

FRESH wire business is being turned down at PITTSBURGH, as mills will have all they can do to get out by the end of the year tonnages already on the books. Makers of lawn fence and welded wire reinforcing road and building fabric advanced the price of these items $3 a ton effective Oct. 1. Northwestern Steel & Wire Co., Sterling, Ill., advanced galvanized barbed wire and Nos. 9 and 11 field fence $3 a ton. Export inquiries for barbed wire are appearing and one involving 10,000 tons is going the rounds. On export inquiries for barbed wire, prices ranging from $6 to $17 above the f.o.b. mill domestic price are being asked and some tonnages have been sold for export at a premium of $13 a ton over the domestic f.o.b. mill price. With one moderate sized producer of merchant wire products having already advanced field fence and barbed wire $3 a ton, it will not be surprising to see other wire makers take similar action in the near future.

The rod situation is extremely tight at CLEVELAND, due to greatly increased demand in the open market, while at the same time consumption in wire producers' own mills is much heavier. Outside of some available capacity for few sizes and types of wire, CLEVELAND producers are practically sold out for the remainder of this year and have stepped out of the export market. Domestic sales on the basis of price at time of shipment have not been encouraged, but will be accepted under certain conditions. September was one of the biggest months in the history of the industry.

Orders at CHICAGO sales offices have slackened somewhat from September's mad pace, but orders still are coming at a brisk rate. All lines are in demand, with perhaps the most activity being in manufacturers' wire. Merchant products are very active, too, however, as farmers are working on their fences.

PLATES

. . . Other mills follow price advance of $5 a ton

ON Monday the Worth Steel Co., Claymont, Del., followed the lead of the Lukens Steel Co. and the Alan Wood Steel Co. in advancing the base price of plates $5 a ton. An Ohio mill also advanced plates the same amount, but has not reached a decision regarding future prices on its other products.

In the East neither the Bethlehem Steel Co. nor the Central Iron & Steel Co. has made any announcement.

Some of the Eastern mills have booked business in the past week at the new prices, which are 2.54c. a lb., delivered NEW YORK, and 2.40c. a lb., PHILADELPHIA. As some of the larger mills in the PITTSBURGH, YOUNGSTOWN and CLEVELAND districts are sold out for the remainder of the year, there will probably be an increasing amount of business in the East at the higher price level.

Export prices on plates have also been advanced, 2.45c. a lb., f.a.s., being generally quoted on tank plates and 2.55c. on ship plates.

Last week the Pennsylvania Railroad released the second lot of plates required for its car building and repairing program. Estimates of the tonnage thus far placed vary from 7000 to 15,000 tons. Several of the smaller independent producers which usually share in this business are understood to have declined their portion as the railroad requested coverage at the 2.10c. base for the remainder of the year.

Requests for coverage are pouring in daily at CLEVELAND and YOUNGSTOWN, intensified since premium prices were inaugurated by several Eastern makers. One producer in the CLEVELAND area is quoting the $5 higher price but has made no public announcement, due to the fact that other products are involved. Tank and boiler fabricators desire large tonnages in a wide range of sizes up to 1 in. Railroad equipment manufacturers continue most active.

Bethlehem Steel Co. has been awarded 2800 tons of plates for a 60-in. municipal intake line at Toledo.

In CHICAGO, the chief demand for plates is from the railroads, nearly all of which have car or car repair programs pending or under way. In addition, however, fabricators are well occupied and are ordering substantial tonnages. Many of the latter are beginning to wish they had maintained better stocks because of the difficulty of obtaining prompt deliveries, even on definitely scheduled contracts. Some mills are sold out for the remainder of the year on plates, largely because of railroad protection.

Norway is inquiring for 1000 tons for several 375,000-gal. tanks.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	Oct. 3, 1939	Sept. 26, 1939	Sept. 5, 1939	Oct. 4, 1938	1939	1938
Fabricated structural steel awards	15,400	22,750	9,250	35,425	755,175	660,275
Fabricated plate awards	4,325	35,715	1,640	1,150	156,085	100,210
Steel sheet piling awards	0	0	2,375	1,300	67,080	34,685
Reinforcing bar awards	10,200	15,825	9,610	9,000	369,295	259,760
Total Letting of Construction Steel..	29,925	74,290	22,875	46,875	1,347,635	1,054,930

SHEETS AND STRIP

. . . First quarter commitments being made at price in effect

NEW sheet and strip orders at PITTSBURGH are practically non-existent. The small number which are being forced on producers are being taken subject to price at time of shipment. The unprecedented increase in railroad car building (in so short a space of time), coupled with the exceptionally heavy requirements from the automotive industry, is giving the nation's modern strip mills their chance to show what they can do. Some consumers failed to get excited about their sheet requirements because of the tremendous capacity available for rolling such material but this contention completely overlooked the possibility that sheet mills would be allocated raw steel supplies in the same manner as other product departments were told how much semi-finished material they might have. Despite the difficulties which are now being faced by production and traffic departments, it is more than likely that all customers will be taken care of on their commitments for fourth quarter delivery.

In the CLEVELAND and YOUNGSTOWN districts the extended mill delivery situation has forced many consumers to turn to warehouses or seconds dealers. This includes a few contract holders who did not specify quickly enough. On the other hand, certain consumers at CLEVELAND have attempted to estimate their requirements 25 per cent to 75 per cent heavy for some months ahead and have so specified. Hot mills and cold reducing facilities are highly engaged but not to their full limits, due to the current scarcity of slabs. Here and there annealing capacity is hard pressed. The galvanized sheet market is particularly hectic. Temporary shortages of railroad cars and trucks continue to be noted.

Except in a very few isolated cases, and these in hot rolled, CHICAGO mills cannot promise 1939 delivery on sheets, regardless of type or size. All motor car makers' specifications are not yet in, but these tonnages will be accommodated somehow. Barrel makers are very active buyers because of the trend toward export of oil and gasoline in barrels rather than in tankers. European nations, many of which desire the fuel for military purposes, find barrels much easier and speedier to handle for distribution to mechanized forces. Sheets, including high tensile, low alloy, are much in demand by the railroads for car programs. Midwest makers of corn bins for the Government are still buying galvanized sheets.

Southern Ohio sheet mills are practically out of the market on all types of sheet steel except stainless and electrical. With order books practically filled for the fourth quarter, mills are trying to stop too great a rush on first quarter commitments. There has been a fair amount of bookings for the first quarter at prices then in effect, but mills are trying to discourage this as much as possible.

Some sheet mills have shipped all their low priced tonnage to customers in the NEW YORK district, and are currently engaged in delivering tonnages taken at current prices early in September. There is still some low priced material overhanging this market, however, on which fourth quarter commitments had been made last May and June. A fair amount of business has been placed on schedule for first quarter delivery at the price prevailing at time of shipment.

BOLTS, NUTS AND RIVETS

. . . Rivet manufacturers have had one of their biggest months

WITH railroad buying exceeding all expectations, rivet manufacturers at CLEVELAND have just finished one of the biggest months in years from the standpoint of new business entered on books. Car builders are very anxious for quick delivery which often creates problems for rivet makers, since temporary difficulty is encountered in promptly obtaining hot rolled bar tonnages speedily. Export inquiry for rivets is strong from the West Indies and South America. All quotations are now f.a.s.

In addition to the revisions in cap and set screw discounts mentioned several weeks ago, milled headless set screw quotations have been altered.

SHIPBUILDING

. . . Passenger boat awarded to Newport News

THE Maritime Commission last week awarded a $3,630,000 contract to the Newport News (Va.) Shipbuilding & Dry Dock Co. for one single screw, steam propelled C-3 combination passenger and cargo vessel. The ship will require a total of 4370 tons of steel. It will be 492 ft. long with a displacement of 16,190 tons, has accommodations for 96 passengers, and will travel at 16½ knots.

SEMI-FINISHED STEEL

. . . A tight supply situation has developed

WITH mills in the PITTSBURGH district booked at capacity, on fourth quarter shipments, new specifications obviously have practically disappeared. The only orders being taken at present, and even then under pressure, are on the basis of price at time of shipment. Chief worries of steel producers now involve production and delivery problems. Any unlooked for holdup in steel making departments will throw a wrench into the present schedules covering fourth quarter shipments. It is becoming increasingly apparent that little or no export tonnage can be taken care of until the first quarter of 1940.

Forgers in the CLEVELAND and YOUNGSTOWN districts are trying to bring their stocks up to normal quickly, some without much success due to the present acute shortage of semi-finished steel. Non-integrated steel producers apparently have enough raw material on hand for current requirements, but their operations are up sharply and a tight situation is developing.

MERCHANT BARS

. . . Mills booked virtually to capacity to year end

FRESH hot rolled bar orders are at ow ebb or practically non-existent in the PITTSBURGH district, as mills are booked to capacity for the remainder of the year with the possible exception of some isolated sizes. Only under consumer pressure is any new business being booked and such orders carry a tag "Subject to price in effect at time of shipment." Mills, of course, are receiving actual specifications and shipping instructions against previous definite commitments. Production departments will be pushed to the utmost, owing to the heavy demand from automotive, railroad, and miscellaneous interests. Pressure is increasing from customers on the question of announcing new steel prices.

CLEVELAND and YOUNGSTOWN mills are far behind on orders, definite delivery promises are virtually impossible to obtain and producers are reluctant to enter orders in the few sizes and grades on which a little capacity exists. Sales on the basis of price at time of shipment are being accepted by some mills. The vast influx of business during September showed bar

mill capacity not too ample for peak periods.

Considerable bar tonnage was received last week in CHICAGO as buyers hastened to get their specifications in before the new extras went into effect. Demand is general, with particular emphasis on the part of automobile parts makers and forgers. The farm equipment industry, especially those companies making small tractors, is busy. Mill overflow is being reflected by increased warehouse requirements.

STRUCTURAL STEEL

. . . Awards 15,400 tons, new projects 14,200 tons

STRUCTURAL steel lettings of 15,400 tons compare with 22,750 tons last week. The largest awards are 1810 tons for an addition to the Pratt & Whitney plant at East Hartford, Conn.; 1800 tons for the Santee-Cooper Dam, Charleston, S. C.; 1240 tons for an apartment building at 1150 Park Avenue, New York, and 1100 tons for a power house addition at Chester, Pa., for the Philadelphia Electric Co.

New structural projects are lower at 14,200 tons and include 3000 tons for stores and a garage for the Board of City Trusts, Philadelphia; and 2500 tons for warehouses at Hickam Field, Hawaii.

American Bridge Co. is low bidder on 4000 tons to Department of the Interior, Bonneville project, for transmission towers for lines from Kelso to Chehalis to Renton, Wash.

REINFORCING BARS

. . . Mills quoting higher prices and restricting quantities

REINFORCING bar makers at PITTSBURGH and elsewhere appear to be little interested in new business at published quotations. Demand for steel from other product divisions on which better prices are being realized have undoubtedly curtailed the amount of raw material that may go into manufacture of reinforcing bars. Inasmuch as new billet reinforcing bars not so long ago were quoted on a parity with hot rolled bars, it would not be surprising to see such a parity again restored. Should such an action, which, of course, would be predicated on supply and demand, occur, the present published price of reinforcing bars would have to be upped $5 a ton.

At ST. LOUIS, mills are limiting quantities, whereas they would not have done so 30 or 60 days ago.

CHICAGO sellers have considerable tonnage booked and in prospect. The 11,000-ton South Side sewage plant is the largest pending job in many months. Some sellers continue to ask more than the 1.90c. official price, over 2.00c. being demanded. One fabricator reports having taken some business at this level.

Reinforcing steel awards total 10,200 tons, including 3000 tons for the final section of the Chicago subway; 1400 tons for a mail order house for Montgomery Ward & Co., Chicago, and 1340 tons for the Central Valley project, Pollock, Cal.

Among reinforcing steel projects of 17,450 tons are 11,000 tons for the South Side sewer, Chicago, and 3000 tons for a housing project at Boston.

TUBULAR GOODS

. . . Orders speeded up but mill stocks are ample

SPECIFICATIONS for oil-country goods from domestic consumers have increased moderately at PITTSBURGH and the incoming rate of business is somewhat in excess of that in effect a month ago. Present circumstances have also speeded up standard pipe orders. With domestic consumption becoming accelerated, and with many mills moderately well booked with export pipe business, rolling mill schedules for the next two months at least will be exceptionally tight. However, some mills have substantial stocks. No intimation of new prices has been forthcoming but a spot announcement in the near future would not be a surprise, such announcement of course reflecting higher prices.

TIN PLATE

. . . Operations at 91% with higher rate expected

TIN plate operations this week are estimated at 91 per cent, up nine points from a week ago. A higher rate is expected next week since many mills are putting hot rolled equipment into operation. Cold reduction tin plate mills throughout the country are already operating above theoretical capacity. Tin plate being shipped is going directly into cans and in many cases going immediately into actual packing operations. The present tempo in operations and shipments is expected to continue unabated throughout the remainder of the year.

Ford Output to be 250,000 in Quarter

DETROIT—Ford Motor Co. and Chevorlet showed 1940 models to the press for the first time this week. Ford cars will be released to the public almost immediately, while Chevrolet announcements are scheduled for approximately Oct. 14.

Ford production for the next three months has been set at a rate that will enable the company to produce more than a quarter of a million of the 1940 model Ford and Mercury cars before the first of the year, it was announced Monday by J. R. Davis, sales manager. Public announcement of the cars will be made Friday. Dealers will be supplied with a substantial number of units by that time, it is announced. Production currently is in excess of 2000 units a day, according to Mr. Davis, and pressure was being applied during the week to bring output in the neighborhood of 3000 cars and trucks a day by the end of the week. Early November is expected to see production reach the 4000 per day level.

The 250,000 schedule for the last quarter represents an increase of 44 per cent over the four-month period of September, October, November and December, 1938. Production for the final quarter this year will be greater than at any time during the past four years.

G. T. Horton Chosen to Head Welding Group

G. T. HORTON, Chicago Bridge & Iron Co., Chicago, has been elected president of the American Welding Society for the 1939-40 fiscal year. Other officers chosen in the recent balloting are: First vice-president, T. C. Smith, General Petroleum Corp., Los Angeles; second vice-president, L. S. Moisseiff, consulting engineer, New York; district vice-presidents, Prof. W. F. Hess, Rensselaer Polytechnical Institute, L. C. Bidder, Carnegie-Illinois Steel Corp., Pittsburgh, K. L. Hansen, Harnischfeger Corp., Milwaukee, A. J. Moses, Combustion Engineering Corp., Chattanooga, and L. W. Delhi, Western Pipe & Steel Co., San Francisco. Newly elected directors-at-large are E. V. David, Air Reduction Sales Co., New York; J. D. Gordon, Taylor-Winfield Corp., Warren, Ohio; Col. G. F. Jenks, Ordnance Department, U. S. Army, and H. S. Smith, Union Carbide Co., New York.

IRON AND STEEL SCRAP

OCT. 3—Although the rate of acceleration of the rise in scrap prices has declined, prices continue to advance throughout the country from $1 to $1.50 a ton on the average over last week's quotations. Based on small mill sales and dealer transactions, No. 1 heavy melting is quoted $1 higher at Pittsburgh and Chicago and the average price is up 50c. at Philadelphia after a spectacular rise of $3.50 there the week before. As a result, THE IRON AGE composite price has advanced 83c. to $22.50, passing by 58c. the high figure of $21.92 of April, 1937. In fact, one would have to go back to April, 1923—over 16 years—to find a higher figure. Top price of No. 1 steel at Pittsburgh, at $24.50, is now $2 above the price of basic pig iron at Neville Island. Railroad steel, strong all over, is bringing as high as $26.50 at Pittsburgh. At Chicago, some railroad specialties were moved up as much as $3 over the previous figures. Other markets reflect the trends in the big consuming centers.

In many districts No. 1 steel is becoming increasingly scarce, although at some centers like Detroit, the higher prices are bringing out material held in yards. A meeting was held in New York last week with leading brokers and representative mills present to see what could be done to control what appeared to be a runaway market. Although the export brokers particularly would like to see prices held down in view of old orders of large size now being covered at increasing losses each week, they saw no way of controlling the small yard dealers who were holding back supplies for higher prices. For the present, export of scrap is having no effect upon the domestic market since shipments have dwindled to a trickle. In fact, the reverse situation obtains.

Chicago

Following a definite sale at $20 last week, several brokers have taken a mill order at $20.50, offering $20 for coverage thereon to dealers. Details of this transaction were guarded closely, but on the strength of the information at hand, however, it is being used as the basis for a heavy melting steel price of $20 to $20.50. A sale was made of railroad steel this week at slightly under $22 a gross ton delivered. Considerable trading is going on in this district and scrap of all grades is moving at a fairly high rate. It is difficult for brokers to buy steel today under $20, but it is understood that slightly less has been paid in isolated instances. Reports are heard of a $21 sale, but confirmation is not available. An Iowa dealer, however, sold a few cars of heavy melting to a broker here for $21. Carnegie-Illinois, whose entry into this market would surely cause a sharp price advance, is making synthetic scrap in large tonnages and a blast furnace blown in last week is understood to be concentrating scrap.

Philadelphia

Conditions surrounding trading here are still very confused and a considerable spread still exists between reported dealer offerings and mill bids, and also between sales of similar material. Continued increases in melting operations have further aggravated the supply situation and while heavy melting grades are moving a little more freely, cast grades are still very difficult to obtain in quantity.

Cleveland

Heavy melting grades are quoted up $1.50 per ton this week, based on mill offers, dealers purchases and small sales here and there. If anything, these nominal prices are on the conservative side, as some items could not be touched at the published figures.

Youngstown

With Valley mill operations above 90 per cent this week, scrap started tightening again Tuesday after several days of nearly normal movement. Steel producers are using all the pig iron possible, but even so are consuming vast amounts of scrap each week. Heavy melting and allied grades are quoted up $1.50 per ton. Dealers at the start of this week were not stepping out too far for material, but may be forced to do so soon.

Cincinnati

The local scrap market continues to rule very strong and active. Most mill interests and foundries are taking virtually all the material offered to them and argument over price is not strong. Dealers', bids on all items have again been increased up to $1 a ton, but the unanimous opinion still is, that scrap is worth whatever it can bring. Current offerings are fairly substantial, although dealers generally indicate that material is not too plentiful at this time.

New York

Exporters continue to feel the pressure of soaring domestic prices and have again advanced their buying prices for scrap material delivered to barges, this time as much as $2 a ton. Prices for material on cars are also much stronger. Heavy buying on the part of the soil pipe foundries in northern New Jersey has also implemented an advance in cast grades delivered to local foundries, as well as cast grades in general.

Boston

Prices are higher all along the line, and still higher quotations are in the making if claimed offers result in actual sales. Brokers generally quote $8 to $8.50 a ton on cars for steel turnings, but actual sales at $8.65 are noted and some holders claim more has been offered. Blast furnace material is generally quoted $6 to $6.25 a ton on cars, while a sale of two cars at $6.65 is reported by a southern New England yard. Skeleton is openly quoted $12.50 to $12.75 a ton on cars, but certain yards maintain they are offered as high as $13.75. Breakable cast is 75c. a ton higher than a week ago, and shafting 50c.

Toronto

Advanced prices for iron and steel scrap which went into effect last week are holding, but machinery cast showed a minor softening tendency about the middle of the week. The sharp jump in prices was reflected in increased offerings of cast scrap and stove plate, but demand has been sufficiently heavy to absorb most of the materials reaching dealers. The advance in prices helped to loosen some dormant stocks, but many collectors still are holding out looking for further advances. Large consumers are holding off, still hoping for lower prices, but dealers are looking for further advances. Mills in the Hamilton area are taking supplies against short term contracts and are paying $13.50 for No. 1 heavy melting and $12.50 for No. 2 with only minor movement.

Detroit

In a market that has been extremely fast in its upward movement in the last two weeks, Detroit scrap prices advanced again as much as $2 a ton on numerous items. The price movement has been so severe that it has thrown some items out of adjustment with others, but has apparently resulted in uncovering some dealers' scrap heretofore held for just such an advance. It is believed that most dealers have now loosened up their hold, each successive boost in price having freed some of the scrap which had been frozen. Dealers are generally of the opinion that they cannot afford to hold onto scrap at these prices and an anomalous condition apparently exists in the fact that some who participated in the advances of the last two weeks—which totaled $4.50 on some items—now are of the opinion that the leveling-off point has been reached.

Pittsburgh

The market remains exceptionally strong and has become somewhat excited within the past few days owing to reported sales of No. 1 heavy melting steel at $26 to a nearby steel plant which is located outside of the Pittsburgh district. It is also reported that this plant has paid $24 a ton for No. 2 steel. It is expected that these sales will have some influence on the Pittsburgh market, as they will more than likely head off material coming to this district. Meanwhile, brokers in this district within the past few days have been paying as high as $24 and $24.50 for No. 1 heavy melting steel and sales into consumption have also been made at these prices. No. 1 steel is quoted this week at $24 to $24.50, up $1 a ton from last week's average. Several small sales of heavy melting industrial scrap, similar in quality to railroad heavy melting, have been made within the past few weeks at $25 a ton and more. Railroad heavy melting steel on the B & O list is reported to have gone at slightly better than $26 a ton to a broker. All scrap transactions continue to be surrounded by a thick wall of secrecy.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$24.00 to $24.50
Railroad heavy melting	26.00 to 26.50
No. 2 heavy melting	22.00 to 22.50
Scrap rails	26.00 to 26.50
Rails 3 ft. and under	26.50 to 27.00
Comp. sheet steel	24.00 to 24.50
Hand bundled sheets	23.00 to 23.50
Heavy steel axle turn.	14.00 to 14.50
Short shov. turnings	17.50 to 18.00
Mixed bor. & turn.	13.00 to 13.50
Cast iron borings	13.00 to 13.50
Cast iron carwheels	21.50 to 22.00
Heavy breakable cast.	19.00 to 19.50
No. 1 cupola cast	23.50 to 24.00
RR. knuckles & coup.	28.00 to 28.50
Rail coil springs	28.00 to 28.50
Rail leaf springs	28.00 to 28.50
Rolled steel wheels	28.00 to 28.50
Low phos. billet crops	29.50 to 30.00
Low phos. punchings	25.50 to 26.00
Low phos. heavy plate	25.50 to 26.00
Railroad malleable	24.50 to 25.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$23.00
No. 2 hvy. mltng. steel	20.00
Hydraulic bund., new	$22.00 to 23.00
Hydraulic bund., old	18.00 to 18.50
Steel rails for rolling	21.50
Cast iron carwheels	22.00 to 22.50
Hvy. breakable cast	20.00 to 21.50
No. 1 cast	24.50 to 25.00
Stove plate (steel wks.)	17.50 to 18.00
Railroad malleable	22.00
Machine shop turn	14.00 to 14.50
No. 1 blast furnace	12.50 to 13.00
Cast borings	12.50 to 13.00
Heavy axle turnings	17.00 to 17.50
No. 1 low phos. hvy.	25.50 to 26.00
Couplers & knuckles	26.00
Rolled steel wheels	26.00
Steel axles	24.50 to 25.00
Shafting	24.50 to 25.00
Spec. iron & steel pipe	16.50 to 17.00
No. 1 forge fire	16.50 to 17.00
Cast boring (chem.)	Nominal

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel	$20.00 to $20.50
Auto. hvy. mltng. steel alloy free	18.25 to 18.75
No. 2 auto steel	15.50 to 16.00
Shoveling steel	20.00 to 20.50
Factory bundles	19.00 to 19.50
Dealers' bundles	17.75 to 18.25
Drop forge flashings	12.00 to 12.50
No. 1 busheling	18.25 to 18.75
No. 2 busheling, old	9.50 to 10.00
Rolled carwheels	22.50 to 23.00
Railroad tires, cut	22.75 to 23.25
Railroad leaf springs	22.50 to 23.00
Steel coup. & knuckles	22.50 to 23.00
Axle turnings	18.50 to 19.00
Coil springs	23.50 to 24.00
Axle turn. (elec.)	20.25 to 20.75
Low phos. punchings	22.50 to 23.00
Low phos. plates 12 in. and under	22.50 to 23.00
Cast iron borings	12.25 to 12.75
Short shov. turn.	13.25 to 13.75
Machine shop turn.	12.25 to 12.75
Rerolling rails	23.25 to 23.75
Steel rails under 3 ft.	22.75 to 23.25
Steel rails under 2 ft.	23.75 to 24.25
Angle bars, steel	22.75 to 23.25
Cast iron carwheels	18.25 to 18.75
Railroad malleable	22.50 to 23.00
Agric. malleable	17.50 to 18.00
	Per Net Ton
Iron car axles	24.25 to 24.75
Steel car axles	24.25 to 24.75
Locomotive tires	18.00 to 18.50
Pipes and flues	15.00 to 15.50
No. 1 machinery cast	17.50 to 18.00
Clean auto. cast	18.00 to 18.50
No. 1 railroad cast	16.75 to 17.25
No. 1 agric. cast	15.00 to 15.50
Stove plate	13.00 to 13.50
Grate bars	13.50 to 14.00
Brake shoes	14.00 to 14.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$22.00 to $22.50
No. 2 hvy. mltng. steel	20.50 to 21.00
Low phos. plate	24.00 to 24.50
No. 1 busheling	21.00 to 21.50
Hydraulic bundles	21.50 to 22.00
Machine shop turn.	13.00 to 13.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$20.50 to $21.00
No. 2 hvy. mltng. steel	19.00 to 19.50
Comp. sheet steel	19.75 to 20.25
Light bund. stampings	15.50 to 16.00
Drop forge flashings	19.00 to 19.50
Machine shop turn.	12.50 to 13.00
Short shov. turn.	13.50 to 14.00
No. 1 busheling	19.25 to 19.75
Steel axle turnings	17.00 to 17.50
Low phos. billet and bloom crops	24.00 to 24.50
Cast iron borings	13.00 to 13.50
Mixed bor. & turn.	13.00 to 13.50
No. 2 busheling	13.00 to 13.50
No. 1 cupola cast	21.50 to 22.00
Railroad grate bars	14.50 to 15.00
Stove plate	14.50 to 15.00
Rails under 3 ft.	24.00 to 24.50
Rails for rolling	22.75 to 23.25
Railroad malleable	21.25 to 21.75

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$21.00 to $21.50
No. 2 hvy. mltng. steel	19.00 to 19.50
Scrap rails	21.00 to 21.50
New hvy. b'ndled sheets	19.00 to 19.50
Old hydraul. bundles	18.00 to 18.50
Drop forge flashings	19.00 to 19.50
No. 1 busheling	19.00 to 19.50
Machine shop turn.	11.50 to 12.00
Shov. turnings	13.00 to 13.50
Mixed bor. & turn.	11.50 to 12.00
Cast iron borings	11.50 to 12.00
Knuckles & couplers	23.50 to 24.00
Coil & leaf springs	23.50 to 24.00
Rolled steel wheels	23.50 to 24.00
No. 1 machinery cast	20.50 to 21.00
No. 1 cupola cast	19.50 to 20.00
Stove plate	16.00 to 16.50
Steel rails under 3 ft.	23.50 to 24.00
Cast iron carwheels	21.00 to 21.50
Railroad malleable	21.50 to 22.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	$18.00 to $18.50
No. 1 hvy. melting	17.75 to 18.25
No. 2 hvy. melting	17.00 to 17.50
No. 1 locomotive tires	17.50 to 18.00
Misc. stand. sec. rails	17.50 to 18.00
Railroad springs	21.50 to 22.00
Bundled sheets	13.00 to 13.50
No. 1 busheling	14.00 to 14.50
Cast bor. & turn.	8.00 to 8.50
Machine shop turn.	8.00 to 8.50
Heavy turnings	12.50 to 13.00
Rails for rollings	20.00 to 20.50
Steel car axles	21.00 to 21.50
No. 1 RR. wrought	12.00 to 12.50
No. 2 RR. wrought	17.00 to 17.50
Steel rails under 3 ft.	21.00 to 21.50
Steel angle bars	20.00 to 20.50
Cast iron carwheels	19.50 to 20.00
No. 1 machinery cast	19.00 to 19.50
Railroad malleable	17.00 to 17.50
No. 1 railroad cast	15.00 to 15.50
Stove plate	11.50 to 12.00
Grate bars	10.50 to 11.00
Brake shoes	12.50 to 13.00

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel	$16.50 to $17.00
No. 2 hvy. mltng. steel	14.50 to 15.00
Scrap rails for mltng.	21.00 to 21.50
Loose sheet clippings	12.00 to 12.50
Hydrau. b'ndled sheets	16.00 to 16.50
Cast iron borings	6.50 to 7.00
Machine shop turn.	7.50 to 8.00
No. 1 busheling	12.50 to 13.00
No. 2 busheling	5.50 to 6.00
Rails for rolling	22.00 to 22.50
No. 1 locomotive tires	18.00 to 18.50
Short rails	23.50 to 24.00
Cast iron carwheels	18.00 to 18.50
No. 1 machinery cast	19.50 to 20.00
No. 1 railroad cast	18.00 to 18.50
Burnt cast	10.75 to 11.25
Stove plate	10.75 to 11.25
Agricul. malleable	16.00 to 16.50
Railroad malleable	19.00 to 19.50
Mixed hvy. cast	17.00 to 17.50

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel	$13.00
Scrap steel rails	15.00
Short shov. turnings	8.50
Stove plate	9.50
Steel axles	18.50
Iron axles	18.50
No. 1 RR. wrought	12.50
Rails for rolling	18.00
No. 1 cast	16.00
Tramcar wheels	16.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. industrial steel	$17.00 to $17.50
No. 2 hvy. mltng. steel	16.00 to 16.50
Borings and turnings	11.00 to 11.50
Long turnings	10.00 to 10.50
Short shov. turnings	12.50 to 13.00
No. 1 machinery cast	16.50 to 17.00
Automotive cast	17.50 to 18.00
Hvy. breakable cast	14.00 to 14.50
Stove plate	11.00 to 11.50
Hydraul. comp. sheets	19.50 to 20.00
New factory bushel	16.00 to 16.50
Sheet clippings	13.50 to 14.50
Flashings	15.50 to 16.00
Low phos. plate scrap	17.50 to 18.00

NEW YORK

Dealers' buying prics per gross ton on cars:

No. 1 hvy. mltng. steel	$16.50 to $17.00
No. 2 hvy. mltng. steel	13.50 to 14.50
Hvy. breakable cast	16.50 to 17.00
No. 1 machinery cast	16.50 to 17.50
No. 2 cast	14.50 to 15.00
Stove plate	13.50 to 14.50
Steel car axles	19.00 to 20.00
Shafting	19.00 to 20.00
No. 1 RR. wrought	14.00 to 15.00
No. 1 wrought long	12.50 to 13.00
Spec. iron & steel pipe	13.50 to 14.00
Rails for rolling	19.00 to 20.00
Clean steel turnings*	9.00 to 10.00
Cast borings*	8.00 to 9.00
No. 1 blast furnace	8.00 to 9.00
Cast borings (chem.)	Nominal
Unprepared yard scrap	9.00 to 9.50
Light iron	5.00 to 5.50

Per gross ton, delivered local foundries:

No. 1 machin. cast†	$18.50 to $19.00
No. 2 cast†	15.50 to 16.00

* $1.50 less for truck loads.
† Northern N. J. prices are $2 to $2.50 higher

BOSTON

Dealers' buying prices per gross ton

Breakable cast	$15.00 to $15.25
Machine shop turn.	8.00 to 8.65
Mixed bor. & turn.	6.25 to 6.65
Bun. skeleton long	12.50 to 12.75
Shafting	18.50 to 19.00
Cast bor. chemical	6.00 to 6.50

Per gross ton delivered consumers' yards:

Textile cast	$18.00 to $19.00
No. 1 machine cast	18.00 to 19.00

Per gross ton delivered dealers' yards:

No. 1 hvy. mltng. steel	$16.00 to $16.50
No. 2 steel	15.00 to 15.50

PACIFIC COAST

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	$14.35
No. 2 hvy. mltng. steel	13.35

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
No. 1 hvy. mltng. steel	$9.75	$9.25
No. 2 hvy. mltng. steel	8.50	8.00
Mixed dealers steel	7.25	6.75
Drop forge flashings	8.75	8.25
New loose clippings	4.75	4.25
Busheling	4.25	3.75
Scrap pipe	4.75	4.25
Steel turnings	4.75	4.25
Cast borings	4.25	3.75
Machinery cast	16.50	16.00
Dealers cast	15.00	14.50
Stove plate	10.00	9.50

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges

No. 1 hvy. mltng. steel	$16.50 to $17.00
No. 2 hvy. mltng. steel	15.50 to 16.00
No. 2 cast	14.50 to 15.00
Stove plate	13.50 to 14.00

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel	$17.50 to $18.00
No. 2 hvy. mltng. steel	16.50 to 17.00
Rails (scrap)	18.00 to 18.50

Philadelphia, delivered alongside boats, Port Richmond.

No. 1 hvy. mltng. steel	Nominal
No. 2 hvy. mltng. steel	Nominal

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher. F.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Gross Ton
Pittsburgh, Chicago or Cleveland	$43.00
Worcester, Mass.	45.00
Birmingham	43.00
San Francisco	52.00

Rods over 9/32 in. or 47/64 in., inclusive, $5 a ton over base.

SOFT STEEL BARS

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham	2.15c.
Detroit, delivered	2.25c.
Duluth	2.25c.
Philadelphia, delivered	2.47c.
New York	2.49c.
On cars dock Gulf ports	2.50c.
On cars dock Pacific ports	2.75c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15c.
On cars dock Tex. Gulf ports	2.50c.
On cars dock Pacific ports	2.75c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt.	1.90c.
Detroit, delivered	2.00c.
On cars dock Tex. Gulf ports	2.25c.
On cars dock Pacific ports	2.35c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham	1.90c.
Detroit, delivered	2.00c.
On cars dock Tex. Gulf ports	2.25c.
On cars dock Pacific ports	2.35c.

IRON BARS

Chicago and Terra Haute	2.15c.
Pittsburgh (refined)	3.60c.

COLD FINISHED BARS AND SHAFTING*

Pittsburgh, Buffalo, Cleveland, Chicago, and Gary	2.65c.
Detroit	2.70c.

* In quantities of 10,000 to 19,999 lb.

PLATES

	Base per Lb.
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland Youngstown, Coatesville, Claymont, Del.	2.10c. to 2.35c.
Philadelphia, del'd	2.15c. to 2.40c.
New York, del'd.	2.29c. to 2.54c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.60c.
Wrought iron plates, P'tg.	3.80c.

FLOOR PLATES

Pittsburgh or Chicago	3.35c.
New York, del'd	3.71c.
On cars dock Gulf ports	3.70c.
On cars dock Pacific ports	3.95c.

STRUCTURAL SHAPES

	Base per Lb.
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham	2.10c.
Philadelphia, del'd	2.215c.
New York, del'd	2.27c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

STEEL SHEET PILING

	Base per Lb.
Pittsburgh, Chicago or Buffalo	2.40c.
On cars dock Gulf ports	2.85c.
On cars dock Pacific ports	2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$40.00
Angle bars, per 100 lb.	2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton	$40.00
Light rails (from rail steel) per gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast ports	2.25c.
Track bolts, to steam railroads	4.15c.
Track bolts to jobbers, all sizes (per 100 counts)	65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

	Base per Lb.
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago	2.00c.
Detroit, delivered	2.10c.
Philadelphia, delivered	2.17c.
Granite City	2.10c.
On cars dock Pacific ports	2.50c.
Wrought iron, Pittsburgh	4.10c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago	3.05c.
Detroit, delivered	3.15c.
Granite City	3.15c.
Philadelphia, delivered	3.37c.
On cars dock Pacific ports	3.65c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

From May 10 up to and including May 15, reductions from the base price of hot and cold rolled sheets running from $4 to $8 a ton were prevalent. Concessions withdrawn, on May 15.

Subsequent to May 15, many orders originally placed at $4 to $6 below the base price were adjusted to the full $8 concession.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham	3.50c.
Philadelphia, delv'd	3.67c.
Granite City	3.60c.
On cars dock Pacific ports	4.00c.
Wrought iron, Pittsburgh	6.10c.

Electrical Sheets

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary	3.80c.
F.o.b. cars dock Pacific ports	4.50c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland	3.35c.
Detroit, delv'd	3.45c.
Granite City	3.45c.
On cars dock Pacific ports	3.95c.

TIN MILL PRODUCTS

***Tin Plate**

	Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary	$5.00
Standard cokes, Granite City	5.10

* Prices effective Nov. 10 on shipments through first quarter of 1939.

Special Coated Manufacturing Ternes

	Per Base Box
Granite City	$4.40
Pittsburgh or Gary	4.30

Roofing Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 112 sheets, 20 x 28 in.)

8-lb. coating I.C.	$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Black Plate, 29 gage and lighter

Pittsburgh, Chicago and Gary	3.05c.
Granite City	3.15c.
On cars dock Pacific ports, boxed	4.00c.

HOT ROLLED STRIP

(Widths up to 12 in.)

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham	2.00c.
Detroit, delivered	2.10c.

Cooperage Stock

Pittsburgh & Chicago	2.10c.

From May 10 up to and including May 15, reductions in the base price of hot rolled strip running from $4 to $8 a ton were prevalent. Concessions withdrawn on May 15.

Subsequent to May 15, many orders originally placed at $4 to $6 below the base price were adjusted to the full $8 concession.

COLD ROLLED STRIP*

	Base per Lb.
Pittsburgh, Youngstown or Cleveland	2.80c.
Chicago	2.90c.
Detroit, delivered	2.90c.
Worcester	3.00c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland	2.95c.
Detroit, delivered	3.05c.
Worcester	3.35c.

From May 10 up to and including May 15, reductions from the base price of co'd rolled strip amounting to $4 a ton were prevalent. Concessions withdrawn on May 15.

COLD ROLLED SPRING STEEL

		Pittsburgh and Cleveland	Worcester
Carbon	0.26-0.50%	2.80c.	3.00c.
Carbon	0.51-0.75	4.30c.	4.50c.
Carbon	0.76-1.00	6.15c.	6.35c.
Carbon	1.01-1.25	8.35c.	8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Galvanized wire, base	2.65c.*
Spring wire	3.20c.

* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

	Base per Keg
Standard wire nails	$2.40
Coated nails	2.40
Cut nails, carloads	3.70

	Base per 100 Lb.
Annealed fence wire	$2.90
Galvanized fence wire	3.30
Polished staples	3.20
Galvanized staples	3.35
Twisted barbless wire	3.25
Woven wire fence, base col...	67 to 70
Single loop bale ties, base col...	56
Stand. 2 pt., 12.5 gage barbed cattle wire, per 80 rod spool...	$2.70
Stand. 2 pt., 12.5 gage barbed hog wire, per 80 rod spool....	$2.88

Note: Birmingham base same on above items, except spring wire.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel			*Wrought Iron*		
In.	Black	Galv.	In.	Black	Galv.
⅛	56	36	¼ & ⅜	..+9	+30
¼ to ⅜	.59	43½	½	24	6½
½	.....63½	54	¾	30	13
¾	.....66½	60½	1 & 1¼	.34	19
1 to 3	...68½	60½	1½	38	21½
			2	.....37½	21

Lap Weld

2	61	52½	2	.....30½	15
2½ & 3	..64	55½	2½ to 3½	31½	17½
3½ to 6.66		57½	4	.....33½	21
7 & 8.65		55½	4½ to 8.32½		20
9 & 10.64½		55	9 to 12	..28½	15
11 & 12.63½		54			

Butt weld, extra strong, plain ends

⅛	.....54½	41½	¼ & ⅜	.+10	+43
½ to ⅜	.56½	45½	½	25	9
½	.....61½	37½	¾	31	15
¾	.....65½	57½	1 to 2	...38	22½
1 to 3	...67	60			

Lap weld, extra strong, plain ends

2	59	51½	2	.....33½	18½
2½ & 3	..63	55½	2½ to 4.39½		25½
3½ to 6.66½		59	4½ to 6.37½		24
7 & 8.65½		56	7 & 8	..38½	24½
9 & 10.64½		55	9 to 12	..32	20½
11 & 12.63½		54			

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount of $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 9 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall.
(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld Hot Rolled
1 in. o.d.	13 B.W.G.	$ 9.01	$ 7.82	....
1¼ in. o.d.	13 B.W.G.	10.67	9.26	....
1½ in. o.d.	13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d.	13 B.W.G.	13.42	11.64	11.06
1 in. o.d.	13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d.	13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d.	12 B.W.G.	18.45	16.01	15.16
2½ in. o.d.	12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d.	12 B.W.G.	21.42	18.59	17.54
3 in. o.d.	12 B.W.G.	22.48	19.50	18.35
3½ in. o.d.	11 B.W.G.	28.37	24.62	23.15
4 in. o.d.	10 B.W.G.	35.20	30.54	28.66
4½ in. o.d.	10 B.W.G.	43.04	37.35	35.22
5 in. o.d.	9 B.W.G.	54.01	46.87	44.25
6 in. o.d.	7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	30%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago.	$54.80
6-in. and larger, del'd New York	52.20
*6-in. and larger, Birmingham..	46.00
6-in. and larger, f.o.b. deck, San Francisco or Los Angeles....	52.00
F.o.b. dock, Seattle.....	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles	55.00
F.o.b. dock, Seattle.....	52.00

Class "A" and gas pipe, $3 extra
4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45, Birmingham, and $53.80 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
½ in. and 6 in. and smaller....	68½
Larger and longer up to 1 in..	66
1⅛ in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3, and 7	68½
Hot pressed nuts, and c.p.c. and t-nuts, square or hex. blank or tapped:	
½ in. and smaller	67
9/16 in. to 1 in. inclusive.....	64
1⅛ in. and larger	62

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

	U.S.S.	S.A.E.
Semi-fin. hexagon nuts		
½ in. and smaller	67	70
9/16 to 1 in.	64	65
1⅛ in. and larger.....	62	62

In full container lots, 10 per cent additional discount.

Stove bolts in packages, with nuts loose	72½
Stove bolts in packages, with nuts attached, add 15% extra.	
Stove bolts in bulk	83½

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½ in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.40

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland Chicago, Birmingham ...65 and 10

Cap and Set Screws

(Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.)

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller....50 and	10
Milled headless set screws, cut thread ¼ in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70
Upset set screws, cup and oval points	75
Milled studs	52

Alloy Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Base price, $56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base.....	2.70c.
Delivered, Detroit	2.80c.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2100 (1½% Nickel)	$0.75
2300 (3½% Nickel)	1.55
2500 (5% Nickel)	2.25
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.85
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4340 Chr.-Ni.-Mo.	1.65
4345 Chro.-Ni.-Mo.	1.85
4600 Nickel - molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni.)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
6100 Chromium spring steel....	0.15
6100 Chromium-vanadium bar...	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. base per lb. Delivered Detroit, 3.45c., carlots.

STAINLESS & HEAT RESISTANT ALLOYS

(Base prices, cents per lb. f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes..	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip ...	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot stp.	17c.	17.50c.	24c.	35c.
Cold stp.	22c.	22.50c.	32c.	52c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton f.o.b. United Kingdom Ports

Ferromanganese, export	Nominal
Tin plate, per base box	20s. 9d.
Steel bars, open hearth..	£10 8s.
Beams, open hearth....	£10
Channels, open hearth..	£10 5s.
Angles, open-hearth	£10
Black sheets, No. 24 gage.	£13
Galvanized sheets, No. 24 gage	£15 15s.

CONTINENTAL

Per Gross Ton, Gold £, f.o.b. Continental Ports

Billets, Thomas	Nominal
Wire rods, No. 5 B.W.G...	£5 10s.
Steel bars, merchant	£5 5s.
Sheet Bars	Nominal
Plate ¼ in. and up.....	£5 7s.
Plate 3/16 in. and 5 mm...	£5 13s.
Sheet ⅛ in.	£5 9s. 6d.
Beams, Thomas	£4 18s.
Angles (Basic)	£4 18s.
Hoops and strip, base....	£5 12s.

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$24.00.
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	24.00
Delivered Brooklyn	26.50
Delivered Newark or Jersey City	25.53
Delivered Philadelphia	24.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	23.00
F.o.b. Buffalo	23.00
F.o.b. Detroit	23.00
Southern, delivered Cincinnati	23.06
Northern, delivered, Cincinnati	23.44
F.o.b. Duluth	23.50
F.o.b. Provo, Utah	21.00
Delivered, San Francisco, Los Angeles or Seattle	26.50
F.o.b. Birmingham*	19.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	$23.50
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	23.50
F.o.b. Buffalo	22.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	22.50
Delivered Philadelphia	24.34
Delivered Canton, Ohio	23.89
Delivered Mansfield, Ohio	24.44
F.o.b. Birmingham	18.00

Bessemer

F.o.b. Buffalo	$24.00
F.o.b. Everett, Mass.	25.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	25.00
Delivered Newark or Jersey City	26.53
Erie, Pa., and Duluth	24.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown	23.50
F.o.b. Birmingham	24.00
Delivered Cincinnati	24.11
Delivered Canton, Ohio	24.89
Delivered Mansfield, Ohio	25.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo	$28.50

Gray Forge

Valley or Pittsburgh furnace	$22.50

Charcoal

Lake Superior furnace	$27.00
Delivered Chicago	30.34

Canadian Pig Iron

Per Gross Ton

Montreal	
Foundry iron	$27.50 base
Malleable	28.00 base
Basic	27.50 base
Toronto	
Foundry iron	$25.50 base
Malleable	26.00 base
Basic	25.50 base

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$100.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$32.00
Domestic, 26 to 28%	39.50

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk)	$69.50*
50% (ton lots in 50 gal. bbl.)	80.50*
75% (carload lots, bulk)	126.00*
75% (ton lots in 50 gal. bbl.)	139.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio

Per Gross Ton

10.00 to 10.50%	$32.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50%	$26.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon	10.50c.*
2% carbon	16.50c.*
1% carbon	17.50c.*
0.10% carbon	19.50c.*
0.06% carbon	20.00c.*

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon	$98.00
2.50% carbon	103.00
2% carbon	108.00
1% carbon	118.00

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads	$2.00
Ferrotungsten, 100 lbs. and less	2.25
Ferrovanadium, contract, per lb. contained V., delivered	$2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots	$2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville	$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.
Molybdenum oxide briquettes 48-52% Mo; per lb. contained Mo, f.o.b. Langeloth, Pa.	80c.

* Spot prices are $5 per ton higher.
† Spot prices are 10c. per lb. of contained element higher.

*ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%	$5.25
Old range, non-Bessemer, 51.50%	5.10
Messabi, Bessemer, 51.50%	5.10
Messabi, non-Bessemer, 51.50%	4.95
High phosphorus, 51.50%	4.85

Foreign Ore*

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria	12c.
Iron, low phos., Swedish, average, 68½% iron	12c.
Iron, basic or foundry, Swedish, aver. 65% iron	11c.
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	40c.
Man., African, Indian, 44-48%	37c.
Man., African, Indian, 49-51%	41c.
Man., Brazilian, 46 to 48%	35c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	$22.00 to $24.00
Tungsten, domestic, scheelite delivered	23.00 to 25.00
Chrome or (lump) c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	$17.00
Rhodesian, 45%	21.00
Rhodesian, 48%	24.50
Turkish, 48-49%	25.00
Turkish, 45-56%	23.00
Turkish, 40-41%	18.50
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton: 50%	$26.00
48-49%	25.00

* All foreign ore prices are nominal.

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$20.00
Domestic, f.o.b. Ohio River landing barges	$20.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines	$20.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	$22.50 to $23.50
Domestic No. 1 ground bulk, 96 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	$31.60

FUEL OIL

Per Gal.

No. 2, f.o.b. Bayonne, N. J.	4.375c.
No. 6, f.o.b. Bayonne, N.J.	2.74c.
No. 5 Bur. Stds., del'd Chicago	3.25c.
No. 6 Bur. Stds., del'd Chicago	2.75c.
No. 3 distillate, del'd Cleve'd.	5.375c.
No. 4 industrial, del'd Cleve'd.	5.125c.
No. 5 industrial, del'd Cleve'd.	4.25c.
No. 6 industrial, del'd Cleve'd.	4.00c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt	$4.75 to $5.00
Foundry, f.o.b. Connellsville, Prompt	5.50 to 6.00
Foundry, by - product Chicago ovens	10.25
Foundry, by - product del'd New England	12.50
Foundry, by - product del'd Newark or Jersey City	10.88 to 11.40
Foundry, by - product Philadelphia	10.95
Foundry, by - product delivered Cleveland	10.30
Foundry, by - product delivered Cincinnati	9.75
Foundry, Birmingham	7.50
Foundry, by - product del'd St. Lois industrial district	10.75 to 11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports	14.75

REINFORCING STEEL

. . . Awards of 10,200 tons; 17,450 tons in new projects.

ATLANTIC STATES AWARDS

700 Tons, Boston, housing (South End), to Joseph T. Ryerson & Son Inc., Chicago, through C. J. Maney Co., Inc., contractor.

650 Tons, Washington, administration group, Municipal Centre buildings, to Bethlehem Steel Co., Bethlehem, Pa., through D. M. W. Contracting Co.

550 Tons, Washington, Rock Creek diversion sewer, to Bethlehem Steel Co., Bethlehem, Pa., through Stiers Bros., St. Louis, contractor.

300 Tons, Buffalo, S. S. Kresge Co. store, to Bethlehem Steel Co., Bethlehem, Pa., through Crooker, Carp & Skaer, contractors.

100 Tons, Buffalo, Baltimore & Ohio Railroad grade elimination, to Truscon Steel Co., Youngstown, through Metzger Construction Corp., contractor.

SOUTH AND CENTRAL

3000 Tons, Chicago, final section subway, to Ceco Steel Products Co., Chicago, through M. J. Boyle Co., contractor.

1400 Tons, Chicago, Montgomery Ward mail order building, to Concrete Steel Co., Chicago.

300 Tons, Grand Rapids, Mich., pumping stations, to Inland Steel Co., Chicago, through Grand Rapids & Steel Supply Co., contractor.

170 Tons, Detroit, General Electric building, to Carnegie-Illinois Steel Corp., Pittsburgh, through McRae Steel Co.

143 Tons, Cuyahoga Falls, Ohio, sewage treatment plant, to Truscon Steel Co., Youngstown, through Steinle-Wolfe, Inc.

133 Tons, Chicago, Lane Tech stadium, to Concrete Steel Co., Chicago.

WESTERN STATES

1337 Tons, Pollock, Cal., Central Valley Project (Invitation 33301-A-1), to Columbia Steel Co., San Francisco.

200 Tons, Walla Walla, Wash., State penitentiary, to Truscon Steel Co., Portland, Ore., through Tri-State Construction Co., Portland, contractor.

152 Tons, Lapine, Ore., Wickiup Dam (Invitation 30708-A), to Columbia Steel Co., San Francisco.

103 Tons, Bramwell, Idaho, Boise project (Invitation 21155-A), to Bethlehem Steel Co., San Francisco.

915 Tons, Fort Peck, Mont., U. S. Engineers, to Sheffield Steel Corp., Kansas City.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

3000 Tons, Boston, housing project.

900 Tons, Reading, Pa., Glenside housing.

300 Tons, Lowell, Mass., housing project.

250 Tons, Hamilton County, N. Y., mostly mesh, highway project R. C. 4079; bids close Oct. 25.

175 Tons, Plymouth, N. H., Kieckefer Container Co.

150 Tons, Harrisburg, Pa., Wm. Howard Day homes.

120 Tons, Washington, relief sewer, Piney Branch.

CENTRAL STATES

11,000 Tons, Chicago, South Side sewage filtration plants, bids Oct. 11.

450 Tons, State of Missouri, highway bridges; Howard County.

300 Tons, Caruthers & Grouch, Kansas City, Mo., low bidders; Dunklin County, 150 tons, C. H. Atkinson Paving Co., Chillicothe, Mo., low bidder on general contract.

200 Tons, Cleveland, Cuts No. 4 and 9, Cuyahoga River straightening; bids in.

130 Tons, Milwaukee, box sewer.

100 Tons, Detroit, Shapiro packing plant.

Unstated tonnage, Savanna, Ill., 117 powder magazines; bids Oct. 8.

WESTERN STATES

4350 Tons, Redding, Cal., Central Valley Project (Invitation 33333-A); Columbia Steel Co., San Francisco, low bidder. Project previously reported.

237 Tons, Alameda, Cal., Navy hangars; H. Mayson, Los Angeles, low bidder on general contract.

102 Tons, Alameda, Cal., Navy base engine test building; Barrett & Hilp, San Francisco, low bidder on general contract.

. . . PIPE LINES . . .

Manley Oil Corp., Keensburg, Ill., plans new 4-in. welded steel pipe line from Keensburg to Maud, Ill., about 25 miles, for crude oil transmission.

Sinclair-Prairie Oil Co., Sinclair Building, Tulsa, Okla., plans welded steel pipe line for natural gas transmission to new natural gasoline plant in East White Point oil field area, San Patricio County, Tex. Line will have capacity for handling about 5,000,000 cu. ft. in 24 hr.

F. L. Dougherty & Co., Central Avenue, Dunkirk, N. Y., plans steel pipe lines for natural gas transmission in connection with drilling several new wells in Stockton and Pomfret Townships, near Cassadaga, N. Y.

Citizens Gas Co., Salisbury, Md., recently acquired by new interests headed by J. B. Whitworth, Chestertown, Md., plans pipe line replacements and extensions in gas distribution system; also improvements in gas plant, with installation of blowers and other equipment.

Tidewater-Seaboard Oil Co., Cayuga, Tex., plans new 4-in. welded steel pipe line between gas recycling plants at Cayuga and Long Lake, Tex., for gas transmission. Cost close to $85,000. J. B. Moore, Jr., is company engineer.

Oklahoma Natural Gas Co., 401 North Harvey Street, Oklahoma City, plans pipe lines for natural gas distribution at Enid, Okla., where 25-year franchise has been secured, extending present system.

Sussex Gas Co., Seaford, Del., plans extensions in gas pipe line system, four miles; also improvements in gas plant at West Seaford, including new gas holder and other facilities.

Hope Natural Gas Co., 545 William Penn Way, Pittsburgh, has approved installation of new 12-in. welded steel pipe line across Ohio River at Round Bottom, Monroe County, Ohio, about 100 miles below Pittsburgh, for natural gas transmission.

North Carolina Public Service Co., First Street, Charlotte, N. C., has acquired gas properties of Consolidated Gas & Electric Co. at Raleigh, Durham and Asheville, N. C., and plans extensions and improvements, including pipe lines.

Bureau of Reclamation, Denver, has awarded 750,000 ft. of 1-in. black steel pipe (Invitation A-38446-B) to Laclede Steel Co., Alton, Ill.

Bureau of Reclamation, Denver, closed bids Oct. 4 on 1,400,000 ft. of 1-in. black steel pipe (Invitation 33433-A), for delivery at Coram, Cal.

CAST IRON PIPE

Abilene, Tex., asks bids until Oct. 9 for pipe line from water reservoir at Fort Phantom Hill to city limits, for main water supply. Cost about $471,000. R. C. Hoppe is city engineer; S. W. Freese, Fort Worth, Tex., is consulting engineer.

Centerville, Tex., plans pipe lines for water system; also 50,000-gal. elevated steel tank and tower, pumping machinery and other waterworks equipment. Bond issue of $54,545 has been approved for this and sewer system. Garrett Engineering Co., 308 Hughes Street, Houston, Tex., is consulting engineer.

Council Grove, Kan., plans pipe line extensions in water system and other waterworks installation. Bond issue of $72,000 will be voted Oct. 6 to make up total of $138,000 for project.

South Milwaukee, Wis., closes bids Oct. 9 for 2000 ft. of 8-in. pipe in 12-ft. lengths for water system, with alternate bids on 2000 ft. of 6-in. in 18-ft. lengths; also for valves tees, plugs and miscellaneous fittings.

Poynette, Wis., asks bids until Oct. 15 for cast iron pipe and fittings for water system. Cost about $60,000 including installation. General Engineering Co., Portage, Wis., is consulting engineer.

Boone Mill, Va., plans pipe lines for gravity water supply. Cost about $25,000. J. B. McCrary Co., Inc., Atlanta, Ga., is consulting engineer.

Bessemer City, N. C., plans pipe lines for water system and other waterworks installation. Fund of $149,779 has been arranged for this and sewer system, of which $45,000 will represent a bond issue.

Rock Hill, S. C., plans pipe line extensions in water system, including lines for increased supply to mill of Rock Hill Printing & Finishing Co. Cost about $65,000. Bond issue is being arranged.

Department of Public Service, City Hall, Lorain, Ohio, Paul Mikus, director, plans about three miles of pipe lines for water supply on water front in connection with harbor and river improvements. Cost about $35,000. Entire project will cost close to $135,000. It is proposed to arrange bond issue in amount noted.

General State Authority, 112 North Second Street, Harrisburg, Pa., plans pipe lines for water system at Western State Penitentiary, Rockview Branch, Bellefonte, Pa. Cost about $140,000. Financing is being arranged. J. R. Ryan, Pollack Road, State College, Pa., is engineer.

Mount Vernon, Wash., plans pipe lines for water system, including main line either from wells to be driven for water source, or from Skagit River, if determined for source of supply. Project is estimated to cost $265,000 if first method is used, or $304,000 using Skagit River. Bonds will be voted in November. Parker & Hill, Smith Tower Building, Seattle, are consulting engineers.

Santa Barbara, Cal., plans pipe line replacements in water system. Cost about $31,524. Financing in part has been concluded through Federal aid.

East Bay Municipal Utility District, Oakland, Cal., has awarded 3467 tons of pipe as follows: 2095 tons of 6 and 12-in. to United States Pipe & Foundry Co., San Francisco; 1103 tons of 4, 8 and 10-in. to National Cast Iron Pipe Co., San Francisco; 269 tons of 16-in. to American Cast Iron Pipe Co., San Francisco.

Sacramento, Cal., has announced American Cast Iron Pipe Co., San Francisco, low bidder on 187 tons of 4 to 12-in. pipe.

5000 Steel Workers Get Jobs in August

PAYROLLS of the steel industry during August rose to $67,894,000, the highest total for any month in nearly two years, and the number employed increased during August to an average of 458,000, an increase of nearly 5000 over July.

Both steel payrolls and employment have increased steadily since late in the spring, monthly payrolls having risen 16 per cent, employment 2 per cent, and average hours per week 12 per cent. The figures for September are expected to show a further gain.

The August payroll of $67,894,000 compares with $59,900,000 in July and $52,712,000 in August, 1939, while the average of 458,000 steel employees compares with 453,000 in July and with 427,000 in August a year ago.

Hourly earnings of wage earners in August averaged 84.7c. per hour, as against 85.9c. in July and 83.2c. in August, 1938.

FABRICATED STEEL

. . . Lettings decline to 15,400 tons from 22,750 tons last week . . . New projects lower at 14,250 tons . . . Plate awards call for 4325 tons.

NORTH ATLANTIC STATES
AWARDS

1810 Tons, East Hartford, Conn., Pratt & Whitney addition, to R. C. Mahon Co., Detroit.

1240 Tons, New York, 18-story apartment building, 1150 Park Avenue, to Harris Structural Steel Co., Plainfield, N. J.

1100 Tons, Chester, Pa., power plant addition for Philadelphia Electric Co., to Lehigh Structural Steel Co., Allentown, Pa.

700 Tons, Erie, Pa., Hammerhill Paper Co. plant addition, to Erie Steel Construction Co., Erie, Pa.

690 Tons, Salamanca, N. Y., State highway bridge, to Lackawanna Steel Construction Corp., Buffalo, through Admiral Construction Corp., Buffalo.

650 Tons, McKeesport, Pa., office and warehouse for Potter-McCune Co., to Bethlehem Steel Co., Bethlehem, Pa.

645 Tons, New York, 10-story apartment building, 170 East 77th Street, to Dreier Structural Steel Co., New York.

530 Tons, New York, 14-story apartment building, 37th Street and Lexington Avenue, to Dreier Structural Steel Co., New York.

500 Tons, Quincy, Mass., Procter & Gamble Co. unit, to New England Structural Co., Everett, Mass.

480 Tons, New York, Consolidated Edison Co., turbine foundations, to American Bridge Co., Pittsburgh.

250 Tons, Apex, N. Y., State bridge FAS-8534, to Harris Structural Steel Co., Plainfield, N. J.

165 Tons, Rome, N. Y., addition to shipping room for Revere Copper & Brass Co., to American Bridge Co., Pittsburgh.

240 Tons, Worcester, Mass., Heald Machine Co. mill addition, to R. C. Mahon Co., Detroit.

145 Tons, Knightville - Huntington, Mass., Knightville Dam, to American Bridge Co., Pittsburgh.

140 Tons, Fredericksburg, Pa., addition, Slyvania Corp., to Bethlehem Steel Co.

135 Tons, Wilmington, Del., five-story building for Bond Mfg. Co., to Belmont Iron Works, Philadelphia.

120 Tons, Keene, N. H., Senior High School, to Lyons Iron Works, Greene, N. Y.

100 Tons, Danbury, N. H., State bridge, to Lackawanna Steel Construction Co., Buffalo.

THE SOUTH

1800 Tons, Charleston, S. C., Santee-Cooper Dam., to Virginia Bridge Co., Roanoke, Va.

305 Tons, Little Rock, Ark., five-story mercantile building, to Arkansas Foundry Co., Little Rock, Ark.

210 Tons, West Palm Beach, Fla., Montgomery Ward store, to Virginia Bridge Co., Roanoke, Va.

130 Tons, Dallas County, Tex., bridge, FAP-592-A, to J. B. Beaird Corp., Shreveport, La.

115 Tons, Yazoo County, Miss., bridge, FAP-179-D, to Jones & Laughlin Steel Corp., Pittsburgh.

CENTRAL STATES

400 Tons, Alton, Ill., building for Alton Box Board Co., to Mississippi Valley Structural Steel Co., St. Louis.

400 Tons, Atchison, Topeka & Santa Fe Railway fourth quarter requirements, 250 tons to Bethlehem Steel Co., 150 tons to Jos. T. Ryerson & Son, Inc., Chicago.

285 Tons, Cleveland, mill buildings, Cleveland Pneumatic Tool Co., to Republic Structural Iron Works Co., Cleveland.

180 Tons. Milwaukee, wheel and general foundry shops for Milwaukee Road, to Milwaukee Bridge Co., Milwaukee.

175 Tons, Londonville, Ohio, mill building for Flexible Co., to Burger Iron Co., Akron, Ohio.

130 Tons, Chicago, repairs to draw bridge Z6A, Milwaukee Road, to Duffin Iron Co., Chicago.

120 Tons, St. Louis, Union Electric garage and service building, to Mississippi Valley Structural Steel Co., St. Louis.

WESTERN STATES

560 Tons, Pearl Rarbor, T. H., power plant, to Bethlehem Steel Co., San Francisco, through Robert E. McKee, Los Angeles, contractor.

450 Tons, Wray, Colo., Arikaree River state bridge, to Bethlehem Steel Co.

275 Tons, Wamsutter, Wyo., Little Snake River state bridge, to Des Moines Steel Co., Des Moines, Iowa.

195 Tons, Oleum, Cal., Union Oil Co. buildings, to Herrick Iron Works, Oakland, Cal.

Unstated tonnage, Mare Island, Cal., floating crane (Specification 9368), to Dravo Corp., Pittsburgh.

PENDING STRUCTURAL PROJECTS
NORTH ATLANTIC STATES

3000 Tons, Philadelphia, stores and garage for Board of City Trusts.

1300 Tons, New York, public school No. 118.

700 Tons, New York, building for National Gypsum Co.

545 Tons, Erie County, N. Y., grade crossing elimination, highway project R.C. 2576; bids close Oct. 25.

300 Tons, Newport, R. I., torpedo station unit.

200 Tons, Oswego, N. Y., theater for Bridge & Second St. Realty Corp.

160 Tons, Greenhaven, N. Y., cell blocks.

150 Tons, Bridgeport, Conn., factory extension for Sprague Meter Co.

140 Tons, Central Islip, N. Y., State buildings.

120 Tons, Washington, girder spans, Southern Railway Co.

120 Tons, Huntington, Pa., auditorium.

100 Tons, Essex County, N. Y., bridge and approaches, highway project S.S. 8535; bids close Oct. 25.

CENTRAL STATES

900 Tons, Springfield, Ill., three State bridges; bids Oct. 5.

700 Tons, State of Kansas, highway bridges.

450 Tons, Missouri Pacific Railroad, beam spans, various locations.

430 Tons, Madison, Wis., four State bridges; bids Oct. 10.

400 Tons, Lincoln, Neb., post office and federal building addition, U. S. Govt.

250 Tons, Beaverton, Mich., State bridge.

250 Tons, Detroit, State grade separation.

225 Tons, Cincinnati, boiler house addition for Procter & Gamble Co.

200 Tons, Watersmeet, Mich., State grade separation.

200 Tons, Decatur, Ind., State bridge No. 1862.

200 Tons, Waupaca, Wis., State bridges Nos. 433 and 434.

150 Tons, Wood County, Ohio, State grade separation.

150 Tons, Rippey, Iowa, State bridge.

140 Tons, Wadhams, Mich., State bridge.

130 Tons, Milwaukee, State Crestwood subway.

125 Tons, Racine, Wis., State bridge No. 259.

WESTERN STATES

4000 Tons, Kelso, Chehalis and Renton, Wash., transmission towers; American Bridge Co., Pittsburgh, low bidder (previously reported).

2500 Tons, Hickam Field, T. H., warehouses; bids Oct. 12.

270 Tons, Stockton, Cal., San Joaquin River bridge (New Jacobs No. 1); bids Oct. 16 (previously reported).

FABRICATED PLATES
AWARDS

2800 Tons, Toledo, 60-in. pipe for municipal intake, Division JA, to Bethlehem Steel Co., Bethlehem, Pa.

700 Tons, Davenport, Iowa, seven oil tanks for Standard Oil Co., of Indiana, to Chicago Bridge & Iron Co., Chicago.

635 Tons, Sacramento, Cal., copper steel plates for Bureau of Reclamation (Invitation 33314-A), to Youngstown Steel & Tube Co., Youngstown, Ohio.

190 Tons, Cape Girardeau, Mo., oil tanks for Standard Oil Co. of Indiana, to Chicago Bridge & Iron Co., Chicago.

Pending Projects

12,000 Tons, Wichita, Kan., sewer project, with alternate bids on concrete pipes.

Court Upholds Small Steel Companies in Dispute Over Wages

THE Labor Department's controversial steel wage determination, which seeks to impose minimum steel wage rates ranging from 62.5c. in the East to 45c. in the South but which has been stayed by court injunction since last March, was characterized early this week as "unwarranted" and "incongruous" by the Circuit Court of Appeals for the District of Columbia in a far-reaching opinion.

In a 3-to-1 decision following up its order of last August remanding the case to the district court for further hearing (see the IRON AGE, Aug. 10, page 96), the court called the challenge of the seven small independent steel mills in the East "well justified," and sustained the contention of the steel companies that "Secretary of Labor Perkins had exceeded her authority in interpreting the word locality. On this point the court said:

"It is true that within proper limits of the meaning of locality, the Secretary is required by the statute to exercise judgment and discretion, but the determination in this case goes so far beyond any possible proper application of the word as to defeat its meaning and to constitute an attempt arbitrarily to disregard the statutory mandate."

The court added that to permit the Secretary to establish a minimum wage scale for the area embraced, which included 13 states, a portion of West Virginia and the District of Columbia—all in the East—"would be to defeat rather than to accomplish the purpose of the act."

The court also upheld the contention of the steel companies that the Walsh-Healey law contains no adequate administrative remedy to meet the grievance alleged, namely, that the steel order was detrimental to small companies, causing them irreparable damage.

Some observers said the decision interprets the Walsh-Healey public contracts act contrary to every action the Secretary of Labor has ever taken under its provisions, and that the effect may be to void all other wage determinations made in other industries.

. . . NON-FERROUS . . .

. . . September copper sales were 180,000 tons . . . Spelter advanced to 6.89c., New York . . . Lead demand moderates, but waiting lists still exist.

NEW YORK, Oct. 3—Although the frenzied activity of early September has given way to more methodical efforts to obtain copper coverage, the daily sales figures still indicate a very active demand. The intensity of the mad scramble for red metal in September is indicated by the fact that close to 180,000 tons was sold, which brought the quarter's bookings to around 400 000 tons of copper. This tonnage should, in view of past experience, supply sufficient metal for fabricating operations well into the first quarter. First-hand sellers are still quoting 12c. per lb., Connecticut Valley, on such business as they accept, while in the open market, copper sales were made ranging from 12.375c. per lb. to 12.625c. during the week.

Zinc

Despite the fact that consumers have already bought sufficient supplies to carry them well into the first quarter, there are no signs yet of lessened demand. Sales in the past week amounted to about 15,000 tons, primarily for December and beyond, as compared with 6990 tons in the preceding week. Shipments were down slightly at 5500 tons. On Wednesday domestic quotations were advanced $5 a ton to the basis of 6.89c. per lb., New York, or $40 above the price ruling two months ago.

Lead

Consumer demand moderated somewhat in the past week, but was still in sufficient volume to maintain fair sized waiting lists on the books of all larger interests. This week's buying was principally for November, and, although books for that month were opened but a short time ago, close to one-third of that month's needs have already been purchased. October requirements are virtually completely covered. Latest unofficial estimates place September shipments at close to 59,000 tons, which would be the highest monthly figure since early 1937. Domestic quotations are unaltered at 5.50c. per lb., New York.

Tin

The past week's market was featured by a rather heavy call for first quarter tin. Larger quantities of tin have been arriving lately, but this material has added little to the market situation as most of it is sold before it is unloaded. The introduction of sales terms in trading activities that are distinctly foreign to past market practice have obscured prices to the point where it is extremely difficult to discern the true market value of tin. In view of this situation, Straits metal prices for the past week are placed at a nominal 60c. per lb., New York.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Sept. 27	Sept. 28	Sept. 29	Sept. 30	Oct. 2	Oct. 3
Copper, Electrolytic[1]	12.00	12.00	12.00	12.00	12.00	12.00
Copper, Lake	12.125	12.125	12.125	12.125	12.125	12.125
Tin, Straits, New York	Nominally 60c. per lb.					
Zinc, East St. Louis[2]	6.50	6.50	6.50	6.50	6.50	6.50
Lead, St. Louis[3]	5.35	5.35	5.35	5.35	5.35	5.35

[1] Delivered Conn. Valley. Deduct ¼c. from New York delivery. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits pig	Nominal	Nominal
Copper, Lake	13.25c.	Nominal
Copper, electro	13.00c.	13.75c.
Copper, castings	12.625c.	13.50c.
*Copper sheets, hot-rolled	20.37c.	20.37c.
*Yellow brass sheets	18.65c.	18.65c.
*Seamless brass tubes	21.40c.	21.40c.
*Seamless copper tubes	20.87c.	20.87c.
*Yellow brass rods	13.97c.	13.97c.
Zinc slabs	7.875c.	8.125c.
Zinc sheets, No. 9 casks	12.00c.	12.10c.
Lead, American pig	6.50c.	6.125c.
Lead, bar	8.95c.	8.75c.
Lead, sheets, cut	8.50c.	8.50c.
Antimony, Asiatic	16.00c.	17.00c.
Alum., virgin, 99 per cent plus	21.50c.	22.50c.
Alum., No. 1 remelt., 98 to 99 per cent	19.00c.	19.50c.
Solder, ½ and ½	Nominal	Nominal
Babbitt metal, commercial grade	Nominal	Nominal

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 1/3; on brass sheets and rods, 40; on brass tubes, 33 1/3, and copper tubes, 40.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	10.125c.	10.75c.
Copper, hvy. and wire	9.125c.	9.50c.
Copper, light and bottoms	8.125c.	8.625c.
Brass, heavy	5.25c.	5.75c.
Brass, light	4.375c.	5.125c.
Hvy. machine composition	8.25c.	9.125c.
No. 1 yel. brass turnings	5.00c.	5.50c.
No. 1 red brass or compos. turnings	8.125c.	8.625c.
Lead, heavy	4.375c.	4.75c.
Cast aluminum	8.50c.	9.50c.
Sheet aluminum	14.50c.	15.50c.
Zinc	3.125c.	4.375c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 14c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $160-$165 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.75c. a lb.

The Strippit Corp., maker of the Wales type adjustable punches and dies, has moved from 1559 Niagara St. to new and larger quarters at 1200 Niagara St., Buffalo. Many new designs and developments are to be added to their line shortly.

The W. F. Hirschman Co., manufacturer of roof and ventilators and auxiliary equipment, of 1245 McKinley Parkway, Buffalo, has purchased the G. Drouve Co., Inc., Bridgeport, Conn., manufacturers of the Anti-Pluvius and Drou-Ve-Lite puttyless skylights.

Superior Steel Corp., Pittsburgh, announces opening of a new district sales office in the Onion Commerce Building, Cleveland, with James D. Clokey, Jr., as district manager.

W. F. Hirschman Co., 1245 McKinley Parkway, Buffalo, ventilators and auxiliary equipment, has purchased G. Drouve Co., Inc., Bridgeport, Conn., maker of puttyless skylights, and has moved machinery to Buffalo works. Bridgeport company was in business more than 40 years.

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

American Car & Foundry Co., 30 Church Street, New York, has approved plans for one-story addition to plant at Berwick, Pa., 85 x 135 ft. Cost over $65,000 with equipment.

Sulmet Alloys Co., 294 Plymouth Street, Brooklyn, metal alloys, has leased former one-story foundry of DeMattia Brothers, Inc., Clifton, N. J., about 25,000 sq. ft. of floor space, for plant, removing present works to new location.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until Oct. 9 for steel castings (Circular 138); until Oct. 19, two contour forming multiple tool lathes (Circular 135); until Oct. 20, four electric platform trucks, each 6000-lb. capacity, four-wheel type (Circular 136).

American Brake Shoe & Foundry Co., 230 Park Avenue, New York, has let general contract to Rust Engineering Co., Pittsburgh, and Martin Building, Birmingham, for three one-story additions to Southern Wheel Division, Birmingham, 137 x 180 ft., 45 x 90 ft., and 60 x 80 ft. respectively for expansion in foundry, charging room and cleaning division, in order noted. Cost close to $100,000 with equipment. J. V. Thomas is company engineer at Birmingham, in charge.

Superintendent of Lighthouses, St. George, Staten Island, New York, asks bids until Oct. 11 for 9934 wrought steel buoy shackles; 1800 pins for wrought steel buoy shackles; 87 wrought iron buoy swivels in four sizes, and 75 wrought iron connecting shackles for 1-in. lightship chain (Circular 60665), 847 pieces of 15-fathom wrought iron open link buoy chain (Circular 70778).

Tide Water Associated Oil Co., 17 Battery Place, New York, has approved plans for new oil refinery and recycling plant at Cayuga, Tex., with power house, machine shops, pumping station and other structures. Award has been made to Frick-Reid Co., Tulsa, Okla., for certain refinery equipment and other contracts will be placed soon. Cost close to $1,500,000 with machinery. Company has offices in Esperson Building, Houston. J. B. Moore, Jr., is company engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 10 for one hydraulic surface grinder (Schedule 7309), 43,500 ft. of air hose for diving apparatus (Schedule 7316), parts for diving apparatus (Schedule 7317), for Brooklyn Navy Yard.

Merck & Co., Inc., Rahway, N. J., chemicals, plans five one-story additions, comprising two extensions to main manufacturing department, about 20,000 sq. ft. of floor space; storage and distributing building, 10,000 sq. ft. of floor space; new pilot plant for experimental and processing operations and addition to laboratory. Cost about $300,000 with equipment. Company has superstructure under way on a three-story addition, 40 x 100 ft., for which general contract was let to White Construction Co., 95 Madison Avenue, New York. Cost about $100,000 with equipment.

Board of Education, High School, Rahway, N. J., Guy M. Howard, secretary, asks bids until Oct. 10 for manual training and shop furniture, miscellaneous metal furniture, steel lockers, laboratory furniture and other equipment for new high school on Madison Avenue.

Thomas A. Edison, Inc., 51 Lakeside Avenue, West Orange, N. J., electrical products, has let general contract to Fatzler Co., 653 South Fifteenth Street, Newark, for two-story addition, 60 x 180 ft., with two one-story wing extensions, to branch plant in Silver Lake district, Belleville, N. J., used for electric battery production. Cost over $100,000 with equipment. W. O. Bartlett, Bloomfield Avenue and Broad Street, Bloomfield, N. J., is architect.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until Oct. 10 for one copper bearing steel door (Circular 410); until Oct. 12, 200,000 ignition cartridges for 81-mm. mortar ammunition (Circular 340).

Philadelphia Electric Co., 1000 Chestnut Street, Philadelphia, has approved plans for addition to steam-electric generating station at Chester, Pa., to include new 50,000-kw. turbo-generator unit and accessories, two high-pressure boilers and auxiliary equipment. Extensions will be made also in transmission and distributing lines. Cost about $7,000,000. Completion is scheduled early in 1941. United Engineers & Constructors, Inc., 1401 Arch Street, Philadelphia, is engineer in charge of erection.

Commanding Office, Ordnance Department, Frankford Arsenal, Bridesburg, Philadelphia, asks bids until Oct. 10 for two automatic indexing machines and one drilling and tapping machine (Circular 377), 10 steel benches (Circular 389); until Oct. 12, four electric furnaces, two electric liquid baths, and one lead pot furnace (Circular 391).

BUFFALO DISTRICT

Geneva Forge Co., Inc., Geneva, N. Y., manufacturer of cutlery, etc., has let general contract to Austin Co., Cleveland, for one-story addition. Cost over $80,000 with equipment.

Lucidol Corp., 293 Larkin Street, Buffalo, chemicals and allied products, has taken over former plant of Jewett Stove & Foundry Corp., Tonawanda, and will remodel for plant. Present works will be removed to new location. Cost close to $100,000 with equipment.

United States Engineer Office, Federal Building, Buffalo, asks bids until Oct. 10 for seven disk plate liners for dredge pumps (Circular 40).

Ajax Flexible Coupling Co., Westfield, N. Y., flexible shaft couplings, etc., has acquired control of Portland Hoe & Cultivator Co., Portland, N. Y., and will continue operations under name of Anderson Hoe & Implement Division.

NEW ENGLAND

Monsanto Chemical Co., Chemical Lane, Everett, Mass., industrial chemicals, has let general contract to William M. Bailey Co., 88 Broad Street, Boston, for two-story and basement addition. Cost close to $60,000 with equipment. Main offices are in St. Louis.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Oct. 9 for one automatic, high-speed production-type hardness testing machine, mounted on self-supporting base (Circular 74), 56,000 compensating springs (Circular 84), two 14-in., heavy-duty hydraulic surface grinders (Circular 75), four thread milling machines, checks, cams, hobs, outboard bearings, etc. (Circular 80); until Oct. 11, dust-collecting equipment (Circular 89), four motor-driven, 12-in. geared-head lathes (Circular 88).

Simonds Saw & Steel Co., Fitchburg, Mass., plans one-story addition, 40 x 75 ft., to branch plant at Lockport, N. Y. Cost close to $40,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 10 for alloy steel propeller castings and forgings (Schedule 7293), for Newport, R. I., naval air station; diesel-electric locomotives (Schedule 7280) for Portsmouth, N. H., and Washington yards; motors, motors and brakes, hoists and brakes, and control equipment (Schedule 7230) for Portsmouth, N. H., and Mare Island yards.

SOUTH CENTRAL

Alabama Drydock & Shipbuilding Co., Mobile, Ala., has arranged for purchase of a 5000-ton drydock unit now at yard of Bruce Drydock Co., Pensacola, Fla., and will transfer to Mobile shipyard for use there as part of expansion program, to include new shop structures and other ship construction and repair facilities. Cost about $175,000.

United States Engineer Office, Mobile, Ala., asks bids until Oct. 13 for one conveyor unit complete (Circular 67).

Alabama Power Co., Birmingham, has plans for new steam-electric generating station at Chickasaw, Ala., with installation of turbo-generator unit and accessories, high-pressure boilers and auxiliary equipment. Company also will make extensions in transmission and distributing lines at Mobile and vicinity. Cost close to $1,000,000 with equipment.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until Oct. 10 for steel castings for line hook guards, check posts and miscellaneous service at lock at Kentucky dam; until Oct. 11, rolled steel armor for same lock, about 190 tons in all.

SOUTH ATLANTIC

Florida Pulp & Paper Co., Pensacola, Fla., John C. Pace, Pensacola, head, now being organized with capital of $3,000,000, plans new pulp and paper plant for production of bond and other high-grade paper stocks under a sulphite pulp process. It will comprise one and multi-story units, with power house, machine shop, pumping station and other mechanical departments. Site is being leased from municipality and work is scheduled to begin early in 1940. Cost over $1,000,000 with equipment. Officials of new company will include Mr. Pace, noted, and A. D. Pace, Pensacola, and James H. Allen, Savannah, Ga., formerly vice-president of Union Bag & Paper Corp., and in charge of branch mill of that company at Savannah.

Public Works Officer, Naval Station, Pensacola, Fla., asks bids until Nov. 1 for one-story industrial building at local yard; also for new gate house and other structures (Specifications 9387).

United States Engineer Office, Charleston, S. C., asks bids until Oct. 10 for six cast steel, cut tooth, herringbone gears (Circular 19).

WASHINGTON DIST.

Quartermaster, Marine Corps, Navy Building, Washington, asks bids until Oct. 9 for brass pipe and fittings, iron pipe and fittings, valves, etc. (Schedule 191).

State Roads Commission, Baltimore, has asked bids on general contract for two one-story shop additions at division headquarters at Laurel, Md., 38 x 219 ft., and 30 x 296 ft. Cost over $75,000 with equipment.

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until Oct. 9 for one vacuum pump (Circular 170); until Oct. 10, two turret lathes (Circular 161).

Safe Harbor Water Power Corp., Lexington Building, Baltimore, plans expansion in hydroelectric generating station at Safe Harbor on Susquehanna River, Pa., including new 25,000-kw. hydraulic turbine unit and auxiliary equipment; also extensions in lines and distribution facilities for service to Pennsylvania Railroad, which secures power from this source for electrified lines in that area. Cost about $1,500,000.

General Purchasing Officer, Panama Canal, Washington, asks bids until Oct. 9 for four electric welding machines, two cement gun machines, 12 mining or ore buckets, 10 burners and 10 burner bases (Schedule 3636), 40,000 railway tie plates, galvanized iron pipe fittings, pipe diestocks, diestocks, split dies, ratchet drills, twist drills, augur bits, hacksaw blades, blacksmith's anvils, scythe blades, etc. (Schedule 3620), riveters and cable

splicers, pressure and vacuum gages, pressure gages, cartridge type resistors, etc. (Schedule 3625); until Oct. 10, 6050 ft. of wire rope, 25,000 ft. of brass pipe, 2000 condenser tubes, brass or bronze pipe fittings (Schedule 3638), 48 pneumatic rock drills, steel drills, four air-driven sump pumps, 12 utility hoists, 12 drifter drills, eight air vibrators (Schedule 3637).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 10 for one motor-driven, single-action cutting press and dies (Schedule 7270) for Alexandria, Va., yard; until Oct. 13, one engine lathe (Schedule 7334) for Washington yard; two motor-driven portable drills (Schedule 7337), two motor-generator sets and two d.c. distribution panels (Schedule 7329) for Norfolk, Va., yard.

SOUTHWEST

Stearman Aircraft Co., R. D. No. 5, Wichita, Kan., near municipal airport, plans one-story addition for expansion in parts and assembling divisions. Cost close to $200,000 with equipment. Overend & Boucher, Brown Building, are architects; Godfrey Hartwell, 1047 West River Boulevard, is engineer.

Monsanto Chemical Co., 1700 South Second Street, St. Louis, industrial chemicals, has let general contract to Fruin-Colnon Contracting Co., Merchants' Laclede Building, for one-story addition, 60 x 140 ft., on West Lesperance Street; also for one-story addition to building on Kosciusko Street, both for storage and distribution. Cost over $65,000 with equipment.

Schroer Brothers, Inc., 2219-25 Campbell Street, Kansas City, Mo., mechanical equipment, has let general contract to H. H. Fox Construction Co., Railway Exchange Building, for rebuilding one-story machine shop, 60 x 140 ft., recently destroyed by fire. Cost close to $40,000 with equipment.

American Compressed Steel Corp., 1300 Woodrow Street, Cincinnati, has arranged for purchase of about two and one-half acres in Woodswether district, Kansas City, Mo., with river frontage, for new branch mill. It will comprise several one-story units for processing light steel scrap into steel specialties. Furnace will be installed. Cost close to $150,000 with equipment.

United States Engineer Office, Conchas Dam, N. M., asks bids until Oct. 9 for one water tank and steel tower complete, for Conchas dam project (Circular 23).

Russell Oil Corp., 4527 Somerset Street, San Antonio, Tex., Raymond T. Russell, head, has purchased oil refinery of Bennett Oil & Refining Co., Harrisburg, Tex. Plans are under way for expansion and improvements, including equipment to double present capacity. Cost over $75,000 with equipment.

OHIO AND INDIANA

Cleveland Pneumatic Tool Co., 3734 East Seventy-eighth Street, Cleveland, has asked bids on general contract for one-story L-shaped addition, 62 x 82 x 120 ft., to be known as plant No. 7; also for additions and improvements in plants Nos. 2 and 6. Cost close to $100,000 with equipment. Ernest McGeorge, East Ninety-third and Quincy Avenue, is consulting engineer.

Kroger Grocery & Baking Co., 35 East Seventh Street, Cincinnati, has let general contract to C. M. Barr, 299 South Front Street, Columbus, Ohio, for two-story and basement addition to branch processing and meat-packing plant at 2210 Lockburne Road, Columbus, 60 x 175 ft. Cost close to $60,000 with equipment. Tietig & Lee, 34 West Sixth Street, are architects, and A. M. Kinney, Inc., Carew Tower Building, mechanical engineer, both Cincinnati.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Oct. 10 for one pipe bender, engine lathe, milling machine, and contour metal sawing, filing and polishing machine (Circular 311), six hand sheet metal brakes, one motor-driven slip roll former, one hand grooving machine, six revolving holders, six sheet metal machines, three hand-power slitting shears, one hand-power ring and circular shears, and 11 machine shears (Circular 290); until Oct. 11, one box type electric heat-treating furnace, two convection type electric furnaces, six heat-treating electric furnaces with automatic pyrometer control, one melting crucible tilting furnace and one electric oven (Circular 313).

Hoosier Lamp & Stamping Co., Oakley and Morgan Streets, Evansville, Ind., metal products, stamped metal goods, etc., has let general contract to Tri-State Contracting Co., 1525 Shanklin Avenue, for one-story addition. Cost close to $40,000 with equipment.

WESTERN PA. DIST.

Corry-Jamestown Mfg. Co., Corry, Pa., steel office furniture, metal filing cabinets, etc., has approved plans for one-story addition, 56 x 110 ft., for expansion in heavy press department. Company also has acquired a one-story building, 59 x 100 ft., adjoining main works, and will remodel for extension in electroplating division, with part for storage and distribution. Cost over $75,000 with equipment.

Board of Public Education, Administration Building, Bellefield Avenue and Forbes Street, Pittsburgh, asks bids until Oct. 10 for machinery, equipment and motors for school use. H. W. Cramblet is secretary.

Quaker State Oil Refining Co., Chambers Building, Oil City, Pa., plans expansion and improvements in local oil refinery for increased production of lubricating and other refined oils. Cost over $85,000 with equipment.

MICHIGAN DISTRICT

Brochu & Haas Tool & Die Stamping Co., Grand Rapids, Mich., has let general contract to Strom Construction Co., Grand Rapids, for one-story addition. Cost close to $45,000 with equipment.

John Bean Co., Lansing, Mich., spraying machinery and parts, has let general contract to H. G. Christman-Lansing Co., Lansing, for one-story and basement addition. Cost about $50,000 with equipment. Lee and Kenneth Black, Lansing, are architects.

Coopersville Packing Corp., Coopersville, Mich., food products, has acquired former local plant of Daggett Canning Co., and will remodel for new plant, providing processing and canning machinery for force of about 100 persons.

Consumers Power Co., Jackson, Mich., has let general contract to Townsend, Bottum & Livermore, Wolverine Building, Ann Arbor, for one-story equipment, service and operating building at Jackson, 105 x 200 ft., with storage, distribution and repair facilities. Cost over $60,000 with equipment.

MIDDLE WEST

Lincoln Mfg. Co., 2617 West Fletcher Street, Chicago, special screw machine products, has let general contract to P. Emil Anderson, 3659 Belle Plaine Avenue, for one-story addition, 50 x 120 ft., for storage and distribution. Cost close to $40,000 with equipment.

Commanding Officer, Ordnance Department, Rock Island Arsenal, Rock Island, Ill., asks bids until Oct. 9 for parts for gasoline motors, including baffles, cones, gaskets, circlips, wrenches, etc., and parts for aviation corps equipment, including armatures, starter brushes, baffles, etc. (Circular 203), commercial half-hard brass name plates (Circular 202).

John Deere Wagon Works, Moline, Ill., tractors, parts, etc., has let general contract to Axel Carlson Co., Moline, for one-story forge shop, 100 x 125 ft. Cost over $60,000 with equipment.

McKee Feed & Grain Co., Muscatine, Iowa, plans new plant for soy bean processing and production, consisting of several one-story units. Cost close to $100,000 with machinery.

Common Council, McGregor, Iowa, plans new municipal electric power plant. Proposed to use diesel engine-generating units and accessories. Cost about $120,000. Special election has been called Oct. 12 to vote bonds in that amount. Young & Stanley, Inc., Muscatine, Iowa, is consulting engineer.

Signal Corps Procurement District, 1819 West Pershing Road, Chicago, asks bids until Oct. 10 for cable and seven reels (Circular 44), filter assemblies (Circular 45).

Phoenix Tool & Mfg. Co., 1850 West Fulton Street, Chicago, has let general contract to City Wide Builders, Inc., 3602 West Grand Avenue, for one-story addition. Cost close to $45,000 with equipment.

Sivyer Steel Casting Co., Milwaukee, is erecting a new building, 60 x 120 ft., to house core room and stainless steel operations. This is first unit in an extensive building program and replaces original plant erected on South 43rd Street in 1910. Cost about $50,000. Locker room, 22 x 112 ft., located on second floor between present foundry building and new unit, will also be built.

Ladish Drop Forge Co., Milwaukee, is building a one-story addition, 185 x 195 ft., to its plant at Cudahy, to be used for heat treating department and a machine shop. Cost about $75,000.

PACIFIC COAST

Criterion Machine Works, Foothill Road, Beverly Hills, Los Angeles, machinery and parts, plans one-story addition, 68 x 75 ft. Cost close to $40,000 with equipment. F. C. Barienbrock, 1018 Twelfth Street, Santa Monica, Cal., is architect.

Commanding Officer, Ordnance Department, Benicia Arsenal, Benicia, Cal., asks bids until Oct. 9 for one 50-hp. Scotch marine type boiler, internally-fired, with oil burner (Circular 12).

Vancouver Iron & Steel Foundry Co., Vancouver, Wash., plans new one-story plant either at Vancouver or Longview, Wash., site now being determined. Cost close to $50,000 with equipment. Day Hilborn, Vancouver, is architect.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Oct. 11 for nine ammunition store houses at naval ammunition depot, Mare Island, Cal. (Specifications 9447); until Oct. 18, new graving dock at Puget Sound Navy Yard, Bremerton, Wash. (Specifications 9400), for which an appropriation of $3,000,000 has been authorized.

Western Brass Works, 1460 Naud Street, Los Angeles, has approved plans for one-story addition, 100 x 150 ft. Cost close to $50,000 with equipment. John M. Cooper, 523 North Bedford Drive, Beverly Hills, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 10 for gasoline-electric or diesel-electric locomotives and spare parts (Schedule 7313) for station at Alameda, Cal.; until Oct. 13, one hydraulic press and set of spare parts (Schedule 7286), four aircraft propellers and spare parts (Schedule 900-2790) for San Diego, Cal., naval air station; until Oct. 17, two precision bench type milling machines (Schedule 7321) for Puget Sound yard, Bremerton, Wash.

Purchasing Agent, Office of Indian Affairs, Federal Office Building, Seattle, asks bids until Oct. 10 for one diesel-electric generating plant (Circular 06860).

FOREIGN

Tyne Chemical Co., Ltd., Tyneside, South Shields, England, industrial chemicals, plans new one-story plant, with division for oil and grease production. Cost over $100,000 with equipment.

Trane Co. of Canada, Ltd., Mowatt Avenue, Toronto, Ont., manufacturer of steam specialties, air-conditioning equipment, etc., has asked bids on general contract for one-story and basement addition, 125 x 300 ft. Cost close to $100,000 with equipment. Mackenzie Waters, 96 Bloor Street West, is architect.

Dominion Radiator & Boiler Co., Ltd., 1322 Dufferin Street, Toronto, Ont., plans one and two-story addition, totaling about 21,000 sq. ft. of floor space, primarily for expansion in boiler-manufacturing division. Present boiler works will be removed from Brantford, Ont., to local plant later and capacity increased. Cost over $65,000 with equipment.

THIS WEEK'S MACHINE . . . TOOL ACTIVITIES . . .

. . . No let-up in tremendous volume of sales . . . Machine tool plants operating at 100% . . . Deliveries being quoted into the latter part of 1940 . . . September sales four to six times those of August

Cincinnati Builders Operating At 100 Per Cent of Capacity

CINCINNATI—Domestic machinery demand is stepping up. District manufacturers indicate that multiple unit orders are now more frequent than heretofore. While builders of tools are loath to reveal specific amounts or sources of business at the present time, it was reported by manufacturers of lathes, milling and grinding machines the past week that several multiple unit orders have been received, the smallest of which called for two units and the largest of which called for an excess of 80 machines. England and France are still very active and are ordering in substantial amounts for current and future delivery, while some ordering from Japanese sources is still reported. Reports that Holland has opened an office in New York for the purpose of making purchases and further announcement that additional French purchasing will be placed through the embassy at Washington, increase manufacturers' expectations of further broadening in the foreign demand.

The question of ability to make deliveries is becoming more and more a serious problem in the district market. While on a large number of standard types of machines, 10 to 12 weeks delivery is now being fairly well maintained, some plants indicate that on the more active types of tools, deliveries are now behind approximately six months. No exact promise of delivery is being made on special types of machines, but manufacturers report that they cannot give exact estimates on deliveries of such types.

Factories are now operating at virtually 100 per cent on the present labor supply. Several plants indicate that they could expand their present operations still more if there was a sufficient supply of skilled labor available, but in the meantime they are forced to limit their current production to the available labor.

September Sales Quadruple Those of August

CLEVELAND—As became evident right after Labor Day, September proved one of the biggest months in history for some dealers and producers. One Middle Western producer's deliveries have been pushed back an additional week each day recently. Four-month promises on lathes are not unusual. A universal boring mill sold here last week was promised for around March 15.

Ford Motor Co. has been buying lathes freely for its tool room and trade school and a few have been purchased for the pattern shop. All these, approximately 40 in number at the last count, are replacement items. Planers have been in good demand, a 40-ft. machine for an Akron plant being included among the sales. Radial drills have been selling well, particularly around Toledo.

National Machine Tool Builders' Association estimates that domestic orders from widely diversified fields of manufacture for the first half of September were double the total for the entire month of August. Foreign orders during this period likewise showed a very substantial increase. W. E. Whipp, association president, pointed out that there has been no general increase in the prices of machine tools and that such price increases as may materialize will be limited to those made absolutely necessary by increased production costs.

Detroit Small Tool Sales Three to Four Times Normal

DETROIT—Tool and machine activity continues at its accelerated pace with three important developments noted in this area. Perishable tools apparently are being "over-bought" about 300 to 400 per cent by most production plants. Buying in anticipation of delivery delays or price increases has become very prominent in the last month and in most instances noted so far quantities have been three to four times the normal requirements. Partly, these increased purchases may be accounted for by higher rates of production. Machine tool inquiries are expected to benefit considerably from instructions given master mechanics in some automobile plants to draw up lists of requirements for 1941 models.

Cancellation of the Machine Tool Show has resulted in a significant development in Detroit where at least one manufacturer of machine tools is preparing to stage a private show of newly developed machines. Other firms also are talking about turning their plant show rooms into little machine tool shows.

Deliveries Being Quoted Into September, 1940

CHICAGO—Orders continue to come in at a good rate, demand showing no decrease whatsoever compared with a week ago. Price advances as well as steadily lengthening deliveries are doubtless big factors in the heavy buying. Inquiries are mostly for single or at the most several machines, few large lists developing in spite of the urgency felt by most buyers. Considerable diversification of demand is reported. Small tools as well as machine tools are well ahead of last month. A large builder in Milwaukee is quoting September, 1940, delivery on some items in his line, foreign business contributing to a great extent to this situation. Domestic buyers are being given preferred deliveries when possible, however.

Military Business Behind The Demand in the East

NEW YORK—There has been no diminution in the volume of orders and inquiries received by local machine tool sellers since Sept. 5, making the month's volume about five or six times that of August. The bulk of present inquiry is of a military nature. The aircraft engine builders are engaged in a tremendous buying program, as was indicated last week. Navy yards and arsenals, which are concentrated in the East, continue to bulk large in weekly sales, and a number of general industrial firms are figuring on possible contracts from the Government for the manufacture of howitzers, shells, torpedoes and other instruments of war. In fact, the bulk of present inquiry, aside from the aircraft business, is for this purpose.

Delivery promises continue to lengthen. March and April, 1940, are frequently mentioned as the average delivery date on many machines, and as late as December, 1940, has been quoted in the last week on a heavy, precision machine. There have been some instances, however, of fairly prompt delivery being quoted in order to meet a competitive situation. Foreign inquiries continue to bulk large, but preference is being given to domestic customers. The Russians are still receiving bids on a cylinder block production line for automotive engines.

. . . GREAT BRITAIN . . .

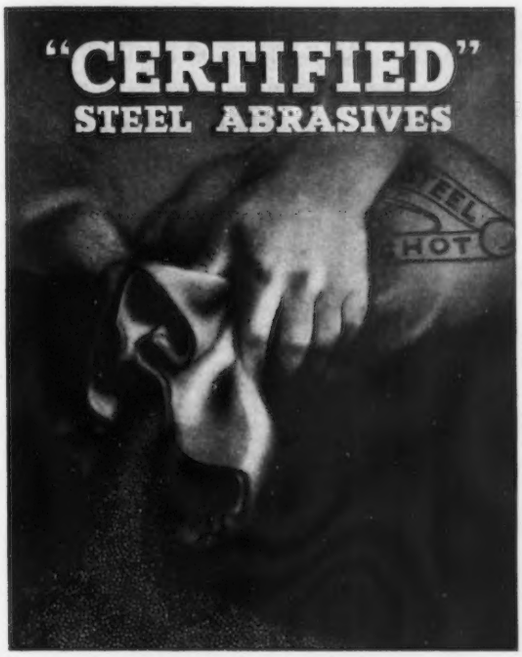
. . . Tin plate being exported but no sheets.

LONDON, Oct. 3 (*By Cable*)—The war budget in Great Britain will not affect activity in the steel industry which is assured maximum productivity during the war period on armament and civil defense contracts. Consumers with licenses can obtain moderately early delivery. Export business is being effected under the license but no sheets are being exported owing to the intense home demand.

Blast furnaces hold plentiful stocks of foreign ore.

The Continental market is slightly more normal, but the shipping position severely hampers overseas exports. Belgium and Luxemburg are selling to Holland and Scandinavia.

There is a strong export demand for tin plate up to 27s. base f.o.b. for shipment up to the end of the first half. Works have little to sell before November and some are fully sold to the end of the year. Mills are worried over uncertainties as to the maximum price of tin plate bars after the end of October.



HOW MUCH WORK . . . PER DOLLAR?

That's the only important question to ask when buying steel abrasives for your many blast cleaning requirements. For the brand *that does the most work per dollar* is your one best bet for profitable blast cleaning.

Fifty years of experience making and selling "Certified" Steel Shot and Grit qualifies us to answer the question. WE KNOW that "Certified" Steel Abrasives are the toughest, hardest abrasives on the market today. New processing developments have increased crushing strength approximately 40%—a *vital factor in economical blasting life!* Skeptical? Let us prove what we know are facts. No obligation or cost. Just write us for "Certified" Steel Abrasive data today!

PITTSBURGH CRUSHED STEEL CO.

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STEEL SHOT AND GRIT CO.

BOSTON, MASS.

"NATIONAL" ROLL

EXTRA HARD ALLOY ROLLS FOR BRASS COPPER ALUMINUM ZINC

SPECIAL WORK ROLLS FOR FOUR-HIGH MILLS

WE SPECIALIZE IN

Rolling Mill Machinery

• Plain Chilled Rolls Cold Rolls **ROLLS** Special Chilled Rolls Sand Rolls •

The National Roll & Foundry Co.

Office and Works: AVONMORE, PA., U. S A.

Here's the Point you must consider

Fig. 1641 Pat's. Pend'g.

...for lowered machinery maintenance costs and accident prevention

In most industrial plants, the continual maintenance work caused by ordinary set screws working loose has long been considered an unavoidable nuisance and expense. Now . . . this labor can be saved . . . the possible accidents can be prevented by equipping machines with

UNBRAKO

Fig. 1645

SELF-LOCKING HOLLOW SET SCREWS with the Knurled Points

Once set up these screws take a firm hold and will not shake or vibrate loose. They're easy to turn in place . . . the ingenious knurling that provides the locking protection offers no resistance during the operation. Removal can be made at any time desired by merely using the ordinary hex bar wrench and the screws used over again any number of times.
Write now for samples and full information.

Fig. 1646 Pat's. Pend'g.

"UNBRAKO" SQUARE HEAD SELF-LOCKING SET SCREWS offer this same unfailing protection combined with high strength and accuracy. We'd be glad to send you a sample so you can try them for yourself.

STANDARD PRESSED STEEL CO.

BRANCHES BOSTON DETROIT INDIANAPOLIS

JENKINTOWN, PENNA. BOX 523

BRANCHES CHICAGO ST. LOUIS SAN FRANCISCO

JUST BETWEEN US TWO

Two-Time Winner

Each year *Industrial Marketing,* the journal of industrial advertising, presents awards for the most distinguished articles appearing in the trade press This is the contest's second year, and on each occasion your favorite family journal has figured in the money.

Prize winner this year was the article, "Flame Scarfing," published in the issue of Oct. 13, 1938, and written by our metallurgical editor, Thomas Wendell Lippert. Tom won an award for us the previous year with his study of the stainless steel industry (May 5, 1938).

Cynical Linotyper

> He (Arthur Leslie Burgin, Britain's Minister of Supplies) also said that the nation now owned completely twenty-eight Royal ordnance factories, six of which had been opened since the start of the war.
>
> He promised the House that "prices, profits and profiteering would be scrutinized carelessly."—*New York Sun.*

That will help.

Metallurgical Muff

In its October article on Germany's material resources, *Fortune* says:

> *"It was impossible . . . for the machine industries to use alloy bearings in place of bronze . . ."*

A bronze mine *would* come in handy.

Secondary Circulation

We buy a morning and an evening paper and keep in touch with midday war developments through the unwilling courtesy of the gentleman who runs a newsstand on 7th Ave. and 40th St. The other day he remarked sarcastically to an especially large gallery of headline kibitzers, of which we were one, "Yez ain't all on relief, are yez?"

Superfluous "C"

"Accicularity," the hexasyllabic that Don James, our Cleveland editor, tossed off airily in his article on austempering, is simply that uncommon noun "acicularity," with an extra "c" thrown in to throw us off. "Needlelike" is what it means.

Psychic Son of the Soil

About two years ago, Sept. 9, 1937, this item appeared here:

> Joseph Schmidt, Whingham, Ont., farmer hoards steel. He has $2,000 worth of new material stored in his barn and expects to cash in at a good profit in the event of European war.

"How much has he made at present prices?" we asked C. E. ("Steve") Wright, our iron and steel market expert. He wouldn't commit himself, saying sourly that the chances are the steel has rusted.

Go East, Young Man

With practically every magazine in the country discovering that it predicted the Hitler-Stalin pact we looked carefully through our issues back to 1932 but must report apologetically that it is something we overlooked.

We will try to be more careful in future and hasten to get into the record this forecast by our own private pipeline to the Kremlin, the anonymous "S. W." of Chicago.

> "Under the Czar, Russia's standard of living was 5 per cent of our present standard; now maybe 35 per cent of ours; in 1942, 60 per cent of ours (barring accidents and war); in 1950, surpassing ours."

It sounds promising, but like S. W. we'll wait a little longer before buying a ticket.

Puzzles

There are 635,013,559,600 possible bridge hands.

C. G. Wilcox, Wallace Barnes Co. metallurgist, is another who found the family age problem of Sept. 14 no Gordian knot. Now take a whiff of this tsetse flybite antidote:

> A piece of rope weighs 4 ounces per foot. It is passed over a pulley and on one end is suspended a weight and on the other end a monkey. The whole system is in equilibrium.
>
> The weight of the monkey in pounds is equal to the age of the monkey's mother in years. The age of the monkey's mother added to the age of the monkey is four years. The monkey's mother is twice as old as the monkey was when the monkey's motther was half as old as the monkey will be when the monkey is three times as old as the monkey's mother was when the monkey's mother was three times as old as the monkey.
>
> The weight of the rope or the weight at the end is half as much again as the difference in weight between the weight and the weight plus the weight of the monkey. How long is the rope?

—A. H. D.